# STRATEGIES FOR THE TRAINING OF TEACHERS IN ENVIRONMENTAL EDUCATION

A Discussion Guide for Unesco
Trainig Seminars on
Environmental Education

UNESCO

Division of Science, Technical
and Environmental Education

# DOCUMENTS IN THE ENVIRONMENTAL EDUCATION SERIES

# Strategies for
# the Training of Teachers
# in Environmental Education

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## P R E F A C E

       This document entitled Strategies For the Training of Teachers in Environmental Education was prepared by Richard Wilke, R. Ben Peyton and Harold R. Hungerford for serving as one of the working documents in a series of regional and subregional training workshops organised in the context of Unesco-UNEP International environmental Education Programme (IEEP). We are pleased to reproduce this document in Environmental Education Series as No.25. Unesco appreciates the work of the authors in the preparation of this document. Suggestions for improving the content and preparation of this document in its future revision can be sent to IEEP, Division of Science, Technical and Environmental Education, Unesco, 7 Place de Fontenoy, Paris 7, France.

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CHAPTER I

INTRODUCTION

An international review of the status of Environmental Education (E.E.) has revealed important deficiencies in teacher training programmes (preservice and inservice). Few, if any, teacher training programmes adequately prepare teachers to effectively achieve the goals of E.E. in their classrooms.[1] This document is one of several efforts by UNESCO to respond to these identified deficiencies in worldwide E.E. The purpose of this paper is to assist interested persons and institutions to develope strategies for incorporating E.E. into the content and teaching methods of preservice and inservice teacher training programmes.

The authors have recognised the futility of recommending specific strategies or training programmes for the diversity of situations which exist throughout the world. Accordingly, we have attempted to anticipate the _types_ of constraints and facilities available and to recommend _processes for developing_ strategies and training programmes. Where models are used to exemplify a strategy, course, or curriculum, it is hoped the example will be considered in that context - as an example which may, or may not be appropriate for other situations.

The following chapter presents a brief review of current efforts in teacher training programmes. That chapter should provide the reader with additional models, sources for consultation, and a concept of what may be

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[1]The Tbilisi Declaration, _Connect_, Vol. III, No. 1, January, 1978.

possible to achieve in the way of training programmes.

Chapter III provides an indepth look at the training of teachers in E.E., both pre- and inservice. First, the need for teacher training in E.E. is discussed. Secondly, the authors have attempted to define the product of the teacher training programme. A set of general competencies for the environmental educator are presented. In actual use for developing teacher training programmes, these general statements must be refined into more specific competencies. If the reader is responsible for this task rather than the authors, the completed competency list should more accurately reflect the local or regional E.E. goals, facilities, and needs of the target population (e.g., inservice or preservice; elementary, secondary, or tertiary levels). Further, refining the competency lists should lead to a better understanding of the content needs in the final teacher training curriculum.

The next major topic in Chapter III is preservice training to achieve the above competencies in E.E. That section is intended to help the reader anticipate problems in developing an infusion training programme and to identify the major characteristics of an effective infusion model. In addition, processes which are involved in developing preservice E.E. programmes are described. An important component of any preservice training programme is an E.E. methods course, and the basic content for such a course is described, along with some suggested strategies for achieving the content goals. Throughout this and subsequent sections, specific examples are included to illustrate the processes, strategies, and major ideas presented. The final sections of Chapter III deal with lnservice teacher training in a similar fashion. Processes, strategies and models for developing an effective inservice programme are described.

The entire document has been prepared as a working paper - a framework to guide the reader in developing effective teacher training programmes in E.E. The authors have drawn heavily on an extensive review of the literature, as well as on their own experiences in presenting the suggestions contained herein, and feel the document represents a collection of proven approaches to teacher training. However, the reader must be aware that there are no simple short cuts to such a monumental task. This document should not be considered a substitute for a planning process which involves those who are to be affected by the final product.

The authors would like to express appreciation to UNESCO for support in this endeavour and to acknowledge the assistance received from our typists Char Pingel and Dorothy Snyder of the College of Natural Resources at the University of Wisconsin at Stevens Point. Additional thanks are extended to Trudi L. Volk of the Science and Environmental Education Center at Southern Illinois University for her critical comments on the content and organisation of the manuscript. As a final note, Dr. Wilke wishes to acknowledge that although he received the contract to prepare this document the contributions- of jrs. Hungerford and Peyton have matched his own. Therefore, there is no hierarchy in regard to authorship. The names of the authors have been listed in reverse alphabetical order.

CHAPTER II

CURRENT TEACHER EDUCATION EFFORTS AND PROGRAMMES
IN ENVIRONMENTAL EDUCATION

The goal of any teacher education effort or programme in environmental education (E.E.) should be to develope environmental education competencies. These competencies (which will be described in a subsequent section) take the form of knowledge, behaviours, and skills which are necessary to effectively incorporate the environmental dimensions in educational programmes.

Numerous strategies have been employed to develope the E.E. competencies of both preservice and inservice teachers. These strategies include but are not limited to: required courses in E.E. for preservice teachers, infusion of competency developing experiences in preservice methods courses, inservice workshops, graduate courses and degrees, staff meetings, conferences, institutes, and the development of specialised teacher centres. The time allocated for the development of E.E. competencies has varied with the strategy selected and the competency or competencies to be developed. On one hand, institutions such as the University of Wisconsin at Stevens Point and Michigan State University (USA) have developed four year programmes for preservice teachers which are aimed at developing teachers certified in E.E. In contrast, staff meetings for inservice teachers may focus on the development or refinement of one specific competency and last less than a few hours.

In a 1977 UNESCO paper on E.E. at the tertiary level for teachers, Saber Selim summarised the status of teacher training for E.E. world-wide. Selim stated:

-National and international attention has been focused on the need to train teachers who are competent environmental educators for placement in primary and secondary level programmes.

-Recent trends in general educational theory and philosophy, as well as new directions in such specific areas as curriculum development have benefited teachers with an interest in E.E.

-Well developed and strongly supported curricula in E.E. for students training to be teachers do not pervade tertiary level institutions at this time; such efforts seem to be limited to individual exemplary programmes dotted around the globe.[1]

In further describing the state of teacher training programmes in E.E., Selim indicated that it is necessary to examine the gap between a clearly perceived international commitment and an inadequate degree of practical implementation. Unfortunately, today there is still a critical world-wide shortage of teachers with the necessary competencies to effectively incorporate the environmental dimension in educational programmes. Although the Tbilisi Declaration[2] recommends that the environmental dimension permeate all areas of the school curriculum, this will not happen unless teachers develope the competencies to make it happen. Some of the current efforts and programmes aimed at developing these competencies in preservice and inservice teachers are described in the remainder of this section.

Preservice Teacher Training Programmes

The implementation of preservice teacher training efforts in E.E. varies greatly from institution to institution and nation to nation. Progress is being made in terms of the quantity and quality of preservice programmes, however, a much greater effort in the area is needed.

Within some states and/or nations, preservice training in E.E. is required for teacher certification. Although these requirements are

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[1]Selim, Saber. "Environmental Education at the Tertiary Level for Teachers," Trends in Environmental Education. (Paris, UNESCO) 1977, p.129
[2]"The Tbilisi Declaration," Connect, (Paris, UNESCO) vol. III, no. 1, January 1978. p.1-8.

encouraging, in most instances the scope of E.E. training required has not been sufficiently broad. With few exceptions, the training provided in ecology or in conservation for preservice teachers has not been adequate to develop the gamut of competencies needed to infuse the environmental dimension into their teaching. Preservice training requirements in E.E. for a few states and nations are described below.

Wisconsin (USA) statutes require adequate instruction in the conservation of natural resources for teacher certification in all elementary and some secondary areas. In Columbia, a fundamental aspect of the national education system has been a programme prepared by the Ministry of Education's Directorate General for Training which ensures the E.E. training of all teachers. In Bulgaria, training in ecology has become a requirement for the qualification of teachers and instructors, particularly in chemistry and biology and in other sciences with links to the environment. In all teacher colleges in Thailand, the curriculum includes two courses on ecology and on the conservation of natural resources. Within the U.S.S.R., the Ministry of Education has made a course on nature conservation compulsory for all teachers in training. Preservice teachers take this course during their third year of training. Since the 1970-71 academic year, the 30 hour nature conservancy course has been included in the curricula of all the 200 pedagogical institutes in the Soviet Union.

In the four Indonesian national teacher-training institutes, E.E. is infused in population education courses. These courses are required for both students of science and humanities. Included are topics such as the impact of population growth on socio-economic development, land use, water management, the energy problem, conservation of natural resources, public health, nutrition, etc. Teaching methods for both population and

E.E. are also included. Since the population education courses are inter-disciplinary, a team teaching approach is used. Despite practical diffi-culties, this interdisciplinary teaching innovation has proved to be use-ful in many ways, not the least of which is that it has led to a better appreciation of interrelationships of many different components of the environment.

Environmental education is an optional subject in the Bachelor of Education programme of the University of Agriculture of Malaysia and the University of Malaya, Kuala Lumpur, while for students in the School for Educational Studies of the Sains University of Malaysia, environment is a major area of study in the course on contemporary educational problems and issues.

In Thailand at the Chiangmai University, the Faculty of Education have organized an interdisciplinary team teaching training programme for preservice teachers. Students take courses related to E.E. in different faculties of the University, such as the faculties of science, agricul-ture, etc.

In cases where training in E.E. is not required for preservice tea-chers, it may be encouraged. Subsequent to Cuba's first national trai-ning workshop on E.E. held in March 1979, the participants recommended that elective courses be added to teacher training institutions which focus on the current state of environmental conservation and improve-ment. Similar recommendations were made after the first workshop on E.E. held-in the Commonwealth of Dominica in December 1978. At that time, the workshop participants recommended that E.E. training be incorporated in the curriculum of the Teachers' Training College.

Although there is not yet compulsory E.E. in schools of the Netherlands, a project for extending it to primary schools, lower agricultural schools

and teacher-training colleges was set up in 1977 and has since been initiated. Among materials for the project is a source book for teachers which contains Background information and practical didactic suggestions.

In Lebanon, the Centre for Educational Development and Research of the Ministry of Education has developed a pilot project in the training of teachers in E.E. The objectives of the project are the development of a programme incorporating environmental elements within the training of teachers for the primary and first cycle of the secondary levels of education.

In 1977 Selim[1] noted that in most developing countries, teacher training colleges do not offer special courses in E.E. As evidenced by some of the programmes described above, the situation has improved somewhat since Selim's observation. However, continued efforts are needed to improve both the quality and quantity of preservice E.E. experiences.

In contrast to the situation in the developing countries, many colleges and universities in the developed countries offer courses and degrees in E.E. Usually, the E.E. courses can be taken as electives by preservice teachers as in the case at Southern Illinois University at Carbondale, Michigan State University at East Lansing, and the University of Wisconsin at Stevens Point (USA). At some institutions, a preservice teacher can elect to concentrate their studies in E.E. Teacher certification in E.E. can be earned through schools, departments or colleges of natural resources at selected institutions. A few of the institutions in the United States offering Bachelors degrees specifically in E.E. are: The Ohio State University in Columbus, Michigan State University at East Lansing and The University of Wisconsin at Stevens Point.

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[1]Selim, Saber. «Environmental Education at the Tertiary Level for Teachers.» Trends in Environmental Education. (Paris, UNESCO) 1977 p.136.

More common than the specialised degree programmes in E.E. are cases where experiences are infused within the teacher education curriculum which assist in developing selected competencies needed by the effective environmental educator. For example, Northern Illinois University at Dekalb (USA) requires all of its preservice elementary education teachers to participate in outdoor education experiences at its Lorado Taft Field Campus. Consequently, the preservice teachers develope a methods competency appropriate to E.E., e.g. the use of the outdoors in teaching.

In methods and curriculum courses at North Texas State University at Denton (USA) various techniques are incorporated such as simulations, role-playing, and the setting of general and specific objectives. Environmental topics are used in the courses to develop student competencies in using the various techniques. The North Texas State example illustrates how E.E. competencies can be developed through existing classes with no change of course title and with no sacrifice of the original course objectives. Only selected E.E. competencies are developed in the two programmes described above.

With the exception of the specialized degree programmes in E.E., very few preservice programmes exist which are designed to develop all the knowledge, behaviors, and skills necessary for preservice teachers to effectively incorporate the environmental dimension in their teaching.

One preservice elementary teacher training programme which has come closer than most others to the goal of developing the necessary E.E. competencies is found at The Ohio State University-Newark Campus (USA). At the Newark campus, elementary teacher education has a coordinating theme of E.E. Faculty at the Newark campus recognized that previous attempts to squeeze in a workshop on E.E. among other coursework was not sufficient.

Faculty believed that a complete package was needed, one that cut across

subject lines and infused E.E. into all preservice methods courses. As

Holt indicated:

> "A programme spas needed that was steadfast enough to allow the
> preservice teacher to become comfortable, over time, with envi-
> ronmental education concepts, skills, and attitudes and rela-
> ted teaching techniques. Experiences were needed - successful
> and relevant ones that would allow for the development of com-
> mitment to an ecological emphasis in the elementary school pro-
> gramme for every boy and girl."[1]

Infused within the Newark programme are experiences to

develop the following E.E. competencies: community resource use,

outdoor education methods, ecological foundations knowledge,

value clarification skills, awareness of environmental issues,

and issue investigation skills. Teacher education faculty at

Newark have incorporated the environmental dimension within

experiences in reading, language arts, social studies, mathema-

tics, and science.

Inservice Teacher Training Programmes

Much must be done to integrate the environmental dimension in all

preservice teacher training. However, the retraining of the many inservi-

ce teachers who are now responsible for the education of elementary,

secondary, and tertiary students will be an even larger challenge. In

this section, efforts and programme. which have been implemented for the

purpose of assisting practicing teachers to incorporate the environmental

dimension in their teaching will be described.

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[1]Holt, Lillabelle."Teacher Education for the Elementary School with
Environmental Education as the Coordinating Theme: The Ohio State
University-Hewark." Environmental Education in Action II: Case Studies of
Environmental Studies Programmes in Colleges and Universities Today.
Schoenfeld, C ; Disinger, d. teds.) Columbus, Ohio, ERIC/SMEAC, 1978. p.
285.

Inservice training of teachers can take various forms. In a 1978 study by Pettus and Schwaab[1], it was found that within Virginia (USA) schools, workshops and courses were the inservice opportunities provided most frequently. The types of E.E. inservice opportunities provided for Virginia's school personnel were as follows: workshops (35.8b), graduate and continuing education courses (33.5%), staff meetings (28%), conferences (26.1°%), staff exchanges (10.6%), institutes (7.3%), released time for staff improvement (5.5%), correspondence courses (0.5%) and others (3.2%). In over 28% of the Virginia schools no inservice was provided in E.E.

In a comprehensive inservice programme the E.E. competencies which the teachers lack are identified, and then strategies are employed to develope the necessary competencies. This type of approach is only

feasible where the inservice teachers are willing and able to devote the necessary time and effort to the inservice. Unfortunately, this type of inservice approach is the exception rather than the rule. Programmes of this nature are usually available at colleges or universities offering graduate degrees in E.E.

The United Kingdom's Poulton-le-Fyide College of Education offers a one year programme for teachers of the 9-13 age group. The programme stresses the nature of environmental change, methods of involving students and teachers in local community environmental problems and the development of environmental resources for schools.

Merber colleges of the Liverpool Area Training Organization also offer a programme aimed at teachers of students aged 9-13. The two year, part-

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[1]Pettus, A. M.; Schwaab, K. E. «A Survey of Virginia Public School Principals on the State of Environmental Education.» <u>The Journal of Environmental Education</u>. Washington, D. C. (USA) vol. 10, no. 2, Winter 1979, p. 35-42

time programme is offered to teachers with one year of experience. Gradu-
ates receive a Diploma in Environmental Education.

Within the United States of America, a number of universities offer
programmes for teachers which lead to a graduate degree in E.E. Among the
universities offering comprehensive programmes are: The Ohio State
University at Columbus, Southern Illinois University at Carbondale, The
University of Wisconsin at Stevens Point, Michigan State University at
East Lansing, and The University of Michigan at Ann Arbor. At each of
these universities, numerous courses and experiences are available for
developing all the necessary E.E. competencies required to incorporate
the environmental dimension.

At Governors State University in Illinois (USA) a comprehensive E.E.
leadership development project was conducted in 197-5 for 32 teachers
from 17 Illinois school districts. One product of this one year project
was a Guidebook to Inservice Environmental Education Workshops for
Teachers[1]. Upon completion of the project, each participant was supposed
to be able to:

1. demonstrate conceptual and practical knowledge about the
   natural and human-altered environments and their interre-
   lationships.
2. describe and analyze contemporary environmental problems
   in terms of natural science and social science principles
   and relationships.
3. utilize a variety of techniques of problem-solving and
   decision making.
4. define value positions for current environmental issues.
5. assess the quality of available instructional materials
   for E.E. in terms of educationally and environmentally
   sound criteria.
6. demonstrate a repertoire of techniques for organising and
   implementing instruction using the environment.
7. demonstrate ability to formulate a generalized plan for
   infusion of E.E. in the curriculum.
8. utilize processes for initiating, implementing, and eva-
   luating changes in instructional programmes.

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[1]Gallagher, J. J. Environmental Education Leadership Development
Project Final Report: A Guidebook to Inservice Environmental Education
Workshops for Teachers. United States Office of Education, Office of
Environmental Education, Washington, D. C. 1975.

Comprehensive inservice programmes can also be made available through the use of a teacher or teaching centre. A teacher centre is a curriculum development and professional staff support system. It allows participants to share human and material resources, to receive individualised and group assistance in a non threatening environment, and to make professional improvements at the participants' own rate and on the participants' own terms. Teacher centres have been widely developed in many countries, including Japan, Sweden, the Netherlands, the United Kingdom, Nigeria and the United States. Environmental education can serve as a special focus for a teacher centre. The Mountain View Centre for Environmental Education at the University of Colorado (USA) is a special focus centre. Local teachers attend the centre after school or in the evenings. Usually, courses last eight or ten sessions and focus on developing a specific E.E. competency. A variation of the teacher centre idea will soon be found in the Netherlands. Since primary teachers there have not yet been trained adequately in environmental matters, it is planned to create in each town, or sizeable. group of municipalities, supporting bodies formed from a variety of sources llO local branches of the Institute for Nature Conservation Education, 30 school library services, nature societies, park services, educational departments of zoos and museums, etc. - in all about 700 groups.

Most inservice programmes are not comprehensive in nature. Instead, the programmes have particular emphases. Some programmes seek to develop competencies related to E.E. methods such as the use of simulations, values clarification, community resource use, etc. Other programmes focus on knowledge or skiffs development, i.e., ecological foundations, conceptual awareness of issues, issue investigation and evaluation, and environmental

action. Still other inservice efforts are aimed at making teachers aware of existing instructional materials for E.E.

The U.S. Forest Service Environmental Education Workshop programme is one which emphasises the development of the process or methods of E.E. Forest Service staff offer inservice workshops throughout the U.S.A. The workshops are designed to put participants in situations where skills and techniques are developed through active involvement in the learning process. One method frequently used is the simulation game. When studying land use decision-making, participants take a local land-use problem that requires a decision. Participants in the simulation then assume the roles of different conflicting interest groups which might be concerned with the problem. Other methods emphasized in Forest Service workshops include questioning techniques and process skills, e.g., observation, interpretation, data collection, evaluation, etc.

The knowledge and skills required for the investigation of environmental issues and for taking environmental action are emphasized in a fifteen week course for teachers offered by the School of Education at the City College of New York. Following an introduction to the literature on environmental issues, the teachers do research on a specific problem and are encouraged to go on to appropriate political action.

Workshops organized by Dean Bennett of the Maine Environmental Education Project (USA) have been organised around activities representing the following skills or processes: discovery-inquiry, evaluation-problem identification, and problem solving. During Bennett's inservice programmes, teachers may become involved in courses, units, short studies, and activities such as presentations, films, and field trips. A few of the techniques and strategies used by Bennett are described in his article, "Inservice

Teacher Education."[1] Among the workshop titles are: (1) Total Environment Awareness Field Trips, (2) Investigation and Evaluation of a Natural or Man-Made Environmental Component, (3) Identification of Community Learning Opportunities, (4) Land Use Simulations, (5) Community Land Use Activity - A Study of the Human Environment, and (6) A Curriculum Analysis Matrix.

Numerous inservice programmes focus primarily on developing ecological knowledge or an awareness of issues. One such programme was developed by the Rhode Island State Agency for Elementary and Secondary Education. An inservice course for elementary and secondary teachers was presented in 15 television programmes A study guide was prepared describing the 15 sessions-. For each session, the guide included: a brief introduction and summary, an outline, questions for further study, and a bibliography of required and optional reading materials. The programmes began with ecology and the human environment and moved to the geographical context of man's surroundings and his relationship to them. Two sessions on population discussed composition, sex ratios, age, growth and economic development. Food, resources, and land conservation led to a study of social problems - poverty, crime, educational disadvantage, unemployment, housing, and urban planning. Man's environment was again examined in terms of pollution; community action was explored; and, in the final session, questions were asked leading to ways of introducing in the curriculum the factors considered.

Another inservice programme emphasising the development of an environmental knowledge base is offered by the International Field Studies Council,

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[1] Bennett, D. "Inservice Teacher Education." <u>What Makes Education Environmental</u>? McInnis, N.; Albrecht, D. (eds.) Louisville, Kentucky,

Shrewsbury, United Kingdom. The Field Studies Council offers short resi-
dential courses in nine centres in England and Wales on such subjects as
conservation, plant and animal ecology, birds, soils, geography, geology
and many others.

Similar to the Field Studies Council is the Environmental Studies
Association of Victoria headquartered in Melbourne, Australia. The En-
vironmental Studies Association is a non-profit non governmental organi-
zation which has been involved in E.E. since 1972. It offers a variety of
study courses ranging from one to three days.

Short workshops have also been used successfully by the
Massachusetts and Seattle chapters of Zero Population Growth. This volun-
teer group has offered numerous weekend workshops for inservice teachers
on population education.

A longer workshop on population education for high school teachers
has been offered in summers by the University of Cincinnati. During the
summer workshop teachers develope their own teaching materials. Lectures
and discussions deal with the history of the population problem, the car-
rying capacity of the earth, and approaches to self-regulation.

Inservice training on the energy issue is being offered in 1980
through hundreds of U.S. newspapers. «Energy and the Way We Live» is a
series of 15 articles written for Courses by Newspaper, a programme of
the University of California at San Diego Extension Service. Funds for
the course were provided by the National Endowment for the Humanities
and National Science Foundation (USA). Credit and non-credit courses
based on the newspaper series are offered for inservice teachers at uni-
versities across the U.S.A.

The use of television and radio media in a large scale E.E. program-me has been one of the most important and effective projects in Chile. The programme was organized by the Facultad de Ciencias Forestales of Chile in cooperation with the national television channel and the Ministry of Education. Many of the programmes have been directed toward inservice teachers by providing supportive materials for curriculum design and teacher training.

Familiarizing inservice teachers with curriculum and instructional materials has been the focus of a substantial number of efforts. The United States Office of Educations 1 National Diffusion Network provides funds and resources to assist teachers and school districts in the adop-tion of nationally validated E.E. programmes. Personnel funded by the Diffusion Network conduct local workshops to familiarize teachers and administrators with their respective E.E. curriculum materials. Information regarding the National Diffusion Network can be obtained from the Division of Replication, U.S. Office of Education, Washington, D.C.

In Missouri, faculty from Northeast Missouri State University (USA) have conducted a programme to prepare teachers to use the Environmental Studies materials produced by the American Geological Institute. A summer programme was followed by inservice follow-up activities during the aca-demic year. Twenty-one schools and about 270 teachers were involved.

Another example of inservice workshops for familiarizing teachers with curriculum materials can be found within central Wisconsin where a Cooperative Educational Services Agency (consortium of school districts) received funds through Title IV C of the Elementary and Secondary Education Act (USA) for dissemination of a supplementary E.E. curriculum programme entitled Project Learning Tree. The director of the dissemination project

and consultants conducted day long inservice workshops for over 300 cen-
tral Wisconsin elementary teachers. The workshops, which were conducted
on scheduled inservice days or on weekends, had the purpose of assisting
teachers in integrating the Project Learning Tree activities in their ed-
ucational programmes.

Also within Wisconsin, the University of Wisconsin at Stevens Point
has plans to offer drive-in conferences for teachers during 1980-81.
These conferences, sponsored by the National Science Foundations'
Dissemination in Science Education Programme, will be held after school
and on Saturdays. Participants will have an opportunity to analyze selec-
ted E.E. curriculum materials. Assistance will be provided to those
interested in implementing any of the E.E. programmes.

Besides workshops, publications have been used to familiarize inser-
vice teachers with curricular and instructional materials for E.E. In the
United Kingdom, the quarterly publication, Review of Environmental
Education Developments (REED),provides such a service. Another British
publication for teachers is the E.E. newsletter produced by the
Conservation Trust and Conservation Society. This newsletter publicizes
new teaching aids and advice on incorporating E.E. into various subject
areas.

In the United States, state and national E.E. organizations also
play a large role in keeping their members updated on available curricu-
lar and instructional materials. Many of these organisations devote a large
portion of their newsletters to information on materials and programmes.
Examples include the newsletters of the National Association for Environ-
mental Education, Conservation Education Association, and the Wisconsin
Association for Environmental Education. These same environmental organi-

zations also use their annual meetings as devices to inform inservice teachers on methods and materials for E.E.

One mechanism Which has been used to facilitate teacher access to, and retrieval of curricular and instructional materials has been the clearinghouse. A clearinghouse may provide a printed guide published periodically, or facility whose staff is responsible for helping teachers locate the information they need.

The <u>Directory of</u> <u>Environmental Literature and Teaching</u> <u>Aids</u> (DELTA) is an example of a «clearinghouse in print.» DELTA offers a regularly updated resource guide for United Kingdom teachers which is published by the School of Education at the University of Reading.

A publication of a similar nature is the <u>Catalogue of Curriculum</u> <u>Resources</u> developed by provincial teachers in Ontario (Canada). The document which is published by the Science Teachers Association of Ontario lists prices and offers a central address for ordering any of the materials listed.

Some clearinghouses or information networks attempt to match teachers with specific resources, provide free referral services, evaluate E.E. materials and, generally, provide broad consulting services for E.E. teachers. One such clearinghouse is ERIC/SMEAC[1] one of the several clearinghouses of the National Institute of Education's ERIC System. ERIC/SMEAC has as its primary purpose the procurement, abstracting, and announcing, through <u>Research in Education</u>, documents pertaining to science, mathematics, and E.E. In addition, SMEAC publishes other documents in its areas of concern (e.g., directories, compilations, and reviews), in

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[1]Persons wishing more information concerning ERIC efforts in environmental education should write: ERIC/SMEAC, The Ohio State University, 1200 Chambers Road, Room 310, Columbus, Ohio 53212 (USA).

which interest and need has been expressed by practitioners. For example, an annual <u>Directory of Projects and Programmes in Environmental Education</u> is published, too<u> Reviews of Research Related to environmental Education</u> have been prepared, volumes of E.E. activities have been published, and a

mailing list of environmental educators is maintained. Using catalogues located at libraries all over the country, teachers can locate materials developed elsewhere, and utilize them in conducting their own E.E. programmes.

Summary

Numerous examples of inservice and preservice E.E. programmes exist. These programmes vary in both breadth and scope. The many programmes described in this section offer a variety of strategies for those interested in establishing a preservice or inservice programme.

Those contemplating the establishment of such a programme should keep in mind that the goal of any teacher education effort should be to develope the E.E. competencies necessary for educators to incorporate the environmental dimension in their teaching. In establishing a programme, careful attention must be paid to local and national conditions. However, of equal significance is the need to articulate the contpetencies to be developed by the inservice or preservice programme. One section of this document, «Competencies Required of an Effective Environmental Educator,» should serve as a useful reference to those planning inservice or preservice programmes in E.E.

CHAPTER III

STRATEGIES FOR THE TRAINING OF TEACHERS IN EE

Need for Teacher Training in Environmental Education

During the past decade much has been written about the need for
environmental education in generals and for teacher training in E.E.
specifically. The need for trained personnel to develop and implement
E.E. programmes has been discussed in numerous UNESCO publications. It
has been stated that "tile possibilities of integrating E.E. into formal
and non formal education programmes and the implementation of such pro-
grammes depend essentially (without however underestimating the importan-
ce of other factors) on the training of the personnel responsible for
putting the programmes into effect."[1]

The need for trained E.E. personnel is apparent in both developed
and developing nations. Within the United States it has been estimated
that "fewer than 10 percent of the teachers in their respective states
had received preservice or inservice instruction in E.E."[2] This is inspi-
te of the views of many teachers and educational administrators who sup-
port the incorporation of '.E. in educational programmes. A brief summary
of teacher and administrator views regarding E.E. expressed in two U.S.
surveys follows. Over 90% of Wisconsin teachers responding to a survey
indicated that they felt E.E. should be an important component of every
students general education.3 In another survey nearly all Virginia princi-

[1]. Regional Meetings of Experts on Environmental Education A synthe-
tic Report. (Paris, UNESCO), August, 1977, p. 41.
[2]. Trent, J.H. «Status of Environmental Education as Perceived By
State Departments of Education.» Unpublished paper, University of Nevada
Reno (USA). 1972.
[3]. Champeau, Randall. «A Teacher Assessment of tile Understanding
and Use of the Goals for Curriculum Development in Environmental
Education.» Unpublished thesis, University of Wisconsin-Stevens Point,
1979.

pals who responded felt that preservice teachers should have environmental education training and Two-thirds thought it should be required.[1]

The need for teacher training in E.E. was expressed by experts on E.E. attending five UNESCO sponsored regional meetings during 1976 and 1977. The training of teacher personnel was seen by participants at all regional meetings as one of the most fundamental aspects of E.E. Because similar conclusions were derived by participants at all regional meetings, it will suffice to include here a pertinent summary statement from one of the meetings. At the Arab States Regional Meeting held in Kuwait, 21-25 November 1976 «the principle need for the further development of environmental education was seen as the training of teachers and leaders, recommendations were made to urge the strengthening of existing training programmes and the creation of new ones. " [2]

The need for teacher training in E.E. has also been documented by responses to a UNESCO questionnaire entitled: «Assessment of Resources for Environmental Education: Needs and Priorities for Member States». This questionnaire was sent during the spring of 1975 to Ministers of Education and other competent authorities of each UNESCO Member State, and obtained the remarkably high response rate of *82%.* The principle conclusion drawn from the survey was that a majority of UNESCO Member States (71%) have (according to the scale of measurement used in the study) very high needs in E.E.[3] Perhaps, the most intense of these needs at the world level concerned the training of personnel for educational activities (81% of the countries). The need for teaching personnel with training in E.E. was

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[1]. Pettus, A.M., Schwaab, K.E. «A Survey of Virginia Public School Principals on the State of Environmental Educations " . Journal of Environmental Education». Washington) Vol. 10, no. 2, winter 1978/79, p. 41.

[2]. Needs and Priorities in Environmental Education: An International Survey. (Paris, UNESCO), August, 1977, p. 3-9.

[3]. International Programme in Environmental Education (UNESCO-UNEP). (Paris, UNESCO), September, 1977, p. 17.

apparent across both geographical regions and educational levels (pre-school, primary, secondary and tertiary).

Past and recent efforts regarding the training of personnel requi-red for the development and implementation of E.E. programmes have been less than desirable. The UNESCO Report entitled <u>Education and the</u> <u>Challenge of Environmental Problem</u>s noted that "relatively few efforts have been made in any of the regions to supplement the traditional <u>trai-</u> <u>ning</u> of teachers, organisers of educational activities,and educational administrators with a view to producing a competent staff for environmen-tal education. Such measures as have been taken generally consist in spo-radically introducing environment related components into traditional training by discipline."[1] Pedagogical problems related to E.E. and the inadequacies of current teacher training Were discussed in more detail in the report. The report indicated that "some of these problems are due to the inadequacies of teacher training for the formal and nonformal sec-tors, which does not allow teachers to acquire the necessary knowledge. Most training programmes suffer in fact from the lack of a holistic conception and tend to lay emphasis on specialization and to encourage too narrow a perception of reality. They do not take into account modern educational ideas based on participation, research and experimentation or of methods of evaluation indispensable for learning centred education. As a result, most teachers and activity organizers are unfamiliar with interdisciplinary techniques geared toward actual problem solving, the evaluation of responses to real situations or problems and team-work."[2]

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1 <u>Education and the challenge of Environmental Problems.</u>
(Paris, UNESC0, August, 1977, p. 19.
2. Ibid., p. 23

Perhaps the most significant event leading to worldwide recognition of the need for teacher training in E.E. was the first Intergovernmental Conference on E.E. convened by UNESCO during October 1977 in Tbilisi, USSR. Delegates from 66 UNESCO Member States and observers from two non Member States participated in the Conference as well as representatives and observers from eight organisations and programmes in the United Nations systems, three other intergovernmental organisations, and 20 international non-governmental organisations. Altogether 265 delegates and 65 representatives and observers took part in the Conference. Resulting from the conference was the Declaration of the Tbilisi Intergovernmental Conference and associated recommendations.

The Final Report from the Tbilisi Conference stated that «the training of qualified personnel was considered to be a priority activity. This holds good for both initial and inservice training, for the purpose of familiarizing teachers in formal education, organizers in non-formal activities for young people and adults, administrative personnel and educational planners and researchers with environment-linked subject matter and educational and methodological guidelines''.[1]

The Conference Report further emphasised «the establishment at the national level of a programme of action, with the aim, on the one hand of familiarizing teachers and educational administrators and planners with different aspects and problems of the environment and on the other hand, giving them a basis of training which would enable them to incorporate environmental education effectively into their respective activities. This action should take the form of both preservice and inservice training». [2]

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[1]. Final Report: <u>Intergovernmental Conference on Environmental Education.</u> (Paris, UNESCO), April, 19,8, p.5.
[2]. Ibid., p. 24.

The Tbilisi Conference Report recommended to Member States that:

- environmental sciences and environmental education be included in curricula for preservice teacher education;

- the staffs of teacher education institutions be assisted in this respect;

- teachers should get environmental training relating to the area, either urban or rural, where they are going to work;

- they take necessary steps to make inservice training of teachers in environmental education available for all who need it;

- the implementation and development of inservice training, including practical training, in environmental education be made in close cooperation with professional organisations of teachers, both at the international and national levels;

- inservice training take account of the area, either urban or rural, where teachers are working;

- education and training institutions should have the necessary flexibility to enable them to include appropriate aspects of environmental education within existing curricula and to create new environmental curricula 'hat meet the requirements of an interdisciplinary approach and methodology;

- teachers and learners should be involved in the preparation and adaptation of instructional materials for environmental education;

- teachers in training should be given an understanding of as wide a range as possible of educational materials and aids, with special reference to low-cost materials and opportunities for adaptation and improvisation in local circumstances.

In order to secure the implementation of the Tbilisi Conference recommendations it will be necessary to convince educational policy makers, educational planners, and faculty from teacher education institutions that there is a great need for preservice and inservice training of teachers in E.E. Those who have kept abreast of the UNESCO/UNEP work in E.E. will, in all likelihood, be cognizant and sympathetic to this need. Unfortunately, there are many educational policy makers, planners, and teacher educators who are neither aware of the UNESCO work, nor of the need for teacher training in E.E. It is these individuals who must be reached. Without their support the

implementation of successful teacher training programmes in E.E. will never be realized.

Because of the differences from nation to nation, it is not feasible for the authors to describe specific directions which could be used to convey the need for teacher training in E.E. to appropriate individuals. Instead, the authors have interspersed examples of strategies which can be used for this purpose throughout this document. Sections of the document which will be especially helpful include the segments on «Infusing EE Into Teacher Training Programmes» and «Implementation of Preservice EE Programmer

One strategy described in this document which should be noted here is the use of seminars and conferences for key educational personnel. The aim of these seminars for key educational planners, administrators and teacher educators should be to first convey the need for teacher training in E.E., and secondly, enlist the support of these individuals in efforts to secure implementation of teacher training programmes in E.E.

In addition to this document, numerous other UNESCO/UNEP documents would be useful to both those organizing such a seminar, and to those attending. These include, but are not limited to:

Inter governmental Conference on Environmental Education, Tbilisi, USSR: Education and the Challenge of Environmental Problems. UNESCO/ENVED 4: Paris, France. 1977.

Inter overnmental Conference on Environmental Education, Tbilisi, USSR: Needs and priorities in Environmental Education An Internatinnal Survey. UNESCO/ENVED 6: Paris, France. 1977.

Intergovernmental Conference on Environmental Education, Tbilisi, USSR Regional Meetings of Experts on Environmental Education—A Synthetic Report. UNESCO/ENVED 7: Paris, France. 1977.

Intergovernmental Conference on Environmental Education, Tbilisi, USSR: Final Report. UNESCO: Paris, France. 1977.

Besides using the international documents listed above, it is of paramount importance that the local, regional and national situations regarding teacher training in E.E. be assessed prior to the seminar. A more specific version of this document designed to take into account the local, regional and national situations would prove to be especially valuable to seminar participants.

In a UNESCO Trend Paper on "Environmental Education at the Tertiary Level for Teachers" Selim offered a conclusion which is as pertinent today as the day he wrote it. He noted that "the conclusion that arises most clearly and pervasively from a consideration of needs in the training of teachers for environmental education is that a broad, multifaceted approach is necessary. A long and arduous journey separates conference rhetoric and goal-setting from practical implementation of effective teacher-training programmes"[1]. The remainder Of this document should assist the reader in this journey by serving as a general map of the territory to be covered during the journey.

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1. Selim, Saber. "environmental Education at the Tertiary Level for Teachers."Trends in Environmental Education. (Paris, UNESCO) 1977, p. 134

Competencies Required of an Effective
Environmental Educator

The initial steps in designing training programmes at either pre or inservice levels must include a definition of the desired teacher product. The most functional way to define the product is in the form of expected behavioral competencies - associated knowledge, skills, and attitudes which are necessary in order to effectively teach environmental education (E.E.) programmes. The descriptions of E.E. competencies found herein have been selected on the basis of two criteria: (1) they represent unique applications of knowledge, attitudes, behavior and/or skills to E.E.; or, (2) they are general education competencies pertinent to E.E. as well as other disciplines, but are not adequately developed by most existing teacher education programmes. Therefore, the competencies proposed here are in addition to the general knowledge, attitudes, and skills expected of an effective educator.

It may well be impossible for a single educational programme to effectively complete the training of teachers in all competency areas. The need for continued development of these competencies will undoubtedly exist throughout the individual educator's career. Accordingly, these competency statements Buy be used to develop preservice programmes or continuing inservice programmes in E.E. teacher training.

Obviously, the E.E. programme emphases at various grade levels should differ according to the needs and capabilities of the receivers. Therefore,

it may be expected that teachers at all levels and in various disciplines may require more or less competency in some of the following areas. A secondary social studies teacher, for example, may require more expertise in the use of case studies as investigative models than is required by a primary level teacher. However, the need for some degree of competency in each of the areas, will remain for all effective E.E. teachers.

The following statements should be interpreted as defining areas of competency which may be used to guide the planning stages of an E.E. teacher training programme. The competencies must be further refined into more specific statements if they are to be functional in selecting topics? teaching strategies, or evaluation schemes for the training programme. Narratives which are intended to exemplify and facilitate the refinement process follow many of the competency area statements. (A subsequent section of this document outlines a methods course for preservice teacher education which incorporates recommended content and samples of instructional strategies consistent with many of the following compentencies). Foundational Competencies in Professional Education

*The effective E.E. teacher should be able to ...*
*(l)...apply a knowledge of educational philosophy to the selection (and/or development) of curricular programmes and strategies to achieve both general education and E.E. goals.*

> (It is important that all educators be aware of the phi-
> losophical basis for education in their own society.
> Environmental education goals and methods should be
> evaluated in light of such philosophies as Experimen-
> talism (Dewey) or Reconstructionism (Brammel). Many

accepted goals of general education supported by such

philosophies are entirely consistent with E.E. goals.

General education materials and methods may sometimes

need to be merely «environmentalized» to achieve the

goals of each).

*(2)...utilize current theories of moral reasoning in selecting, develo -*

*ping and/or implementing E.E. curricula which will effectively achieve*

*accepted goals of S.E. with selected receiver groups.*

(Included in this category of «moral reasoning» are not

only theories of moral development such as Kohlberg's,

but theories of valuing processes as well. E.E. tea-

chers should be competent to assess the developmental

readiness of receivers when dealing with attitudes and

processes in the affective domain, and to utilize

appropriate strategies to allow receivers to recognize

the role of values in environmental decision making,

clarify value positions, and understand the valuing

process).

*(3)...utilize current theories of knowledge/attitude/behavior relation -*

*ships in selecting, developing and/or implementing a balanced curriculum*

*which maximises the probability of desired behavior chances in receivers.*

(Environmental educators often assume linear relation-

ships among ecological knowledge, positive environmental

attitudes, and environmentally ethical behavior. Current

research indicates that such may not be the case. E.E.

teachers must balance their curriculum in view of the

roles of various categories of knowledge (e.g., ecological

knowledge vs. trade-off costs), experiences, and locus of

control (internal or external) in leading to desired

behavioral outcomes).

*(4)...utilize Current theories of learning (e.g., Piaget, Pruner, Gagne')*

*in selecting, developing, and/or implementing curricular materials and*

*teaching strategies to-effectively achieve E.E. goals with selected*

*receiver groups.*

> (The nature of many E.E. goals is problem solving.
>
> Learning theory has much to offer in guiding the selec-
>
> tion of materials and strategies to develope problem
>
> solving abilities. Selection of appropriate E.E. mate-
>
> rials and strategies for specific receiver age levels
>
> may be effective when theories of learning development
>
> (e.g., Piaget) are considered. A pragmatic approach to
>
> this body of knowledge would do much to increase the
>
> effectiveness of E.E. teachers).

*(5)..:apply the theory of transfer of learning in selecting, developing*

*or. implementing curricular materials and strategies to insure that lear-*

*ned knowledge, attitudes, and cognitive skills will be transferred to*

*life style decision-making by receivers.*

> (The ultimate goal of E.E. is to produce environmental-
>
> ly literate citizens who are willing and capable of
>
> taking positive environmental actions in their lives.
>
> Too often, educators fail to teach for the transfer of
>
> knowledge, attitudes and cognitive processes by re-
>
> ceivers (for use both within and outside the formal
>
> classroom).

*(6)...select effective instructional methodologies which are appropriate for desired cognitive and affective outcomes, receiver characteristics, and available facilities (e.g., time, money, personnel).*

*(7)...effectively implement the following methodologies to -achieve E.E. goals:*

   *(A)   outdoor education methods.*

   *(B)   affective education methods (e.g., values clarification, Bank's inquiry model, moral dilemma model).*

   *(C)   simulation games (including role playing).*

   *(D)   case study methods.*

   *(E)   community resource use (ecological, issue related, human resources).*

   *(F)   methods of autonomous student and/or group investigation, evalu- tion and action planning for resolving environmental issues.*

   *(G)   appropriate teacher behaviors while handling controversial environmental issues.*

*(8)...develope and use effective means of planning for instruction.*

*(9)...effectively infuse appropriate E.E. curricula and methods into all disciplines to which the teacher is assigned.*

*(l0)...effectively evaluate E.E. curricula and methods achievement with receivers in both cognitive and affective domains.*

Competencies in Environmental Education Content

### *Level 1: Ecolocical Foundations*

*The effective E.E. teacher should be able to...*

*(ll)...apply a knowledge of ecological foundations to the analysis of environmental issues and identify key ecological principles involved.*

*(12)...apply a knowledge of ecological foundations to predict the ecolo-gical consequences of alternative solutions to environmental problems.*

*(13)...be sufficiently literate in ecology to identify, select, and interpret appropriate sources of scientific information in a continuing effort to investigate, evaluate and find solutions for environmental pro-blems.*

*(14)...communicate and apply in an educational context, the major concepts in ecology.*

(A <u>partial</u> listing of ecological concepts is presented below to provide examples of how this competency level should be further operationalized. The criteria for fur-ther development and selection should include the use-fulness of the ecological concept in understanding man's dependence on a stable, productive ecosystem for survi-val, and how man's activities impact on ecosystems.

A. Individuals, populations, communities, and ecosystems represent legitimate organisational levels in nature which must use homeostatic mechanisms to cope with the laws of the universe (e.g., laws of thermodynamics) and the forces of change in the environment, in order to survive.

B. Changes in the environment or the internal structure of these organisations will predictably cause re-

sponses within as-the organisation attempts to maintain a homeostatic existence.

C.   Populations are organisations of interacting individuals of the same species inhabiting the same geographical area at the same time.

D.   Ecological communities are organisations of populations interacting (e.g., competition, symbiotic relations, predation/parasitism) within a specified geographical region and time.

E.   Communities interact with non-living (abiotic) factors as a more complex organizational level (ecosystems).

F.   Energy flows through and matter must recycle in ecosystems.

G.   Succession is the process of ecosystems changing with time, generally from a less complex stage to a more complex and mature stage.

H.   There is a-general decrease in excess potential energy and in energy flow per unit of biomass as ecosystems change to more mature stages.

I.   When the organization of an ecosystem is disrupted as through exploitation, the maturity of the ecosystem declines.

J.   The population as an organisational level is the basic unit of the ecosystem. Each population occupies a specific functional niche which «fits» into the organization of the ecosystem (e.g., as part of the energy flow and biogeochemical cycles).

*Level II: Conceptual Awareness*

*The effective E.E. teacher should be able to select, develope and/or implement curricular materials which will effectively make recei-vers aware of..*

*(15)...how man's cultural activities {e.g., religious, economic, politi-cal, social, etch influence the environment from an ecological perspecti-ve.*

*(16)...how individual behaviors impact on the environment from an ecological perspective.*

*(17)...a wide variety of local, regional, national and international environmental issues and the ecological and cultural implications of these issues.*

*(18)...the viable alternative solutions available for remediating discre-te environmental issues and the ecological and cultural implications of these alternative solutions.*

*(19)...the need for environmental issue investigation and evaluation as a prerequisite to sound decision making.*

*(20)...the roles plaid by differing human values in environmental issues and the need for personal values clarification as an integral part of environmental decision making.*

*(21)...the need for responsible citizenship action (e.g., persuasion, consumerism, legal action, political action, ecomanagement) in the remediation of environmental issues.*

*Level III:    Investigations and Evaluations*

The effective E.E. Teacher should be competent to investigate environmental issues and evaluate alternative solutions and No developed select and/or implement curricular materials and strategies which will develope similar competencies in receivers, including...

(22)...the knowledge and skills needed to identifg and investigate issues (using both primary and secondary sources of information and to synthesise the data gathered.)

(23)...the ability to analyze environmental issues and the associated value perspectives with respect to their ecological and cultural implications.

(24)...the ability to identify alternative solutions for discrete issues and the value perspectives associated with these solutions.

(25)...the ability to autonomously evaluate alternative solutions and associated value perspectives for discrete environmental issues with respect to their cultural and ecological implications.

(26)...the ability to identify and clarify their own value positions related to discrete environmental issues and their associated solutions.

(27)...the ability to evaluate, clarify, and change their own value positions in light of new information.

*level IV: Environmental Action Skills*

The effective E.E. teacher should be competent to take positive environmental action for the purpose of achieving and/or maintaining a dgnamic

*equilibrium between quality of life and the quality of environment, and*
*to develops, select, and/or implement curricular materials and strategies*
*to develope similar competencies in receivers to take individual or group*
*action when appropriate (i.e., persuasion, consumerism, political action,*
*legal action, ecomanagement, or combinations of these action categories).*

A Process for Curriculum Development
In Teacher Training Programmes

It is difficult to recommend a general training programme model to achieve environmental education (E.E.) competencies in educators. This is due in part to the diversity of designs and constraints which must be considered in existing programmes. Therefore, the discussion that follows will outline a process of curriculum development applied to typical teacher training programs at elementary and secondary levels. The purpose is to present a process as well as, its application, and limitations. The final programme products presented here are for exemplary purposes only, and may not fit the needs and constraints of other situations.

Preservice training programmes in E.E. may involve three approaches: (1) a specific course in E.E. methods; (2) infusion of E.E. methods and foundational components into existing programme courses; and (3) addition of courses in the curriculum which deal with foundational components. Ideally, a preservice training programme would incorporate all three of these approaches. However, constraints imposed by time, facilities and instructor expertise may necessitate otherwise. Identifying and coping with constraints concerning an infusion of E.E. into teacher training programmes is discussed elsewhere in this document.[1] The addition of an E.E. methods course and other foundational courses into an already crowded

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[1]Considerations of the advantages and disadvantages of monodisciplinary and infusion formats are also described in greater detail in Hungerford, H. R. and R. B. Peyton, Developing an Environmental Education Curriculum. United Nations Educational Scientific and Cultural Organization, 7 Place de Fontenay, 75700 Paris, France, 1980.

*teacher training curriculum will present obvious difficulties*
*Elementary Education Programme*

*The initial phase of the E.E. curriculum development should involve a refinement of the expected E.E. competencies. This task should be based on a list of general competencies such as those presented in this document. The completed list of E.E. competencies may then be used to analyse the-existing curriculum to determine where training in specific competencies is already being achieved. For purposes of illustration and discussion, an analysis has been made in Table I of an existing elementary teacher training programme. The analysis presented is only for the foundational competencies in professional education and utilizes only those core courses which provide educational foundations to all students in the exemplary programme (Table I).*

*To be effective, this phase of curriculum planning should involve the faculty assigned to teaching the preservice courses. These individuals will have a more intimate knowledge of course content and be more capable of identifying where E.E. competencies are, or could be taught. Further, their involvement in the process will serve to educate them about the competency goals of E.E., need for infusion, and deficiencies in their own backgrounds.*

*The training programme analyzed in Table I could be better designed to prepare teachers to achieve E.E. goals in their classrooms. One approach would be to modify those courses evaluated as «C» or «D» so that they facilitate development of the designated competencies. Infusion Activity No. III (Page 70 ) presents one example of how a social studies methods course could be used to achieve several of the*

Table I.   Analysis of an Elementary Teacher Training Programme[1,3]

| EE Competencies | Professional Education Courses | | | | | | | | | | | | |
| Foundational Competencies in Professional Education[2] | Exploring Elem. Tchg. | Individual and the School | Curriculum Methods and Materials | Methods Courses | | | | | Critical Reading and Children's Literature | School and Society | Corrective Reading | Developmental Psychology | Student Teaching |
| | | | | Reading | Language Arts | Social Studies | Math | Science | | | | | |
| Apply a knowledge of educational philosophy | D | | | | | | | | | C | | | D |
| Utilize current theories of moral reasoning | | B | C | | | C | | | | | | B,D | D |
| Utilize current theories of knowledge, attitude, behavior relationships | | B | C | | | C | | | | | | B,D | D |
| Utilize current theories of learning | | B | C | C | C | C | C | C | | | | B | D |
| Apply theories of transfer of knowledge | | B | C | D | D | D | D | D | | | | B | D |
| Select effective methodologies | | | C | C | C | C | C | C | | | | B | D |
| Effectively implement: Outdoor Education Methods | | | B | | | | | D | | | | | |
| Affective Education Methods | | | B | | | D | | | | | | | D |
| Simulation games | | | B | | | C | | | | | | | D |
| Case study methods | | | B | | | C | | | | | | | D |
| Community resource Use | | | | | | C | | D | | | | | D |
| Autonomous student and/or group analysis of environmental issues | | | B | | | C | | D | | | | | D |
| Infuse EE curricula into disciplines | | | | D | D | D | D | D | D | | D | | D |
| Develop and use effective planning for instruction | B | B | B | | | | | | | | | | D |
| Effectively evaluate EE curricula and methods | | B | B | | | | | | | | | | D |

A = Coursework contributes directly to this competency
B = Coursework contributes to the foundations required for this competency (e.g., at an introductory level)
C = Competency is developed, but in a non-EE context and/or should be examined more closely for infusion
D = Provides good opportunity for infusing this competency

educational competencies listed. A second approach would be to develope a separate methods course to deal directly with these E.E. competencies. A preservice methods course in E.E. is outlined on pages 87-102. Since time will necessarily limit the effectiveness of either approach, it is more pragmatic to attempt both some degree of infusion, and the development of a separate methods course to supplement the regular programme. Use of both approaches will not only enhance the probability of developing competencies in E.E., but the resulting reinforcement and transfer of basic educational competencies should increase the general teaching effectiveness in other disciplines as-well.

An assessment of E.E. competencies being covered in the remainder of the elementary teacher training programme will be more difficult to achieve. The rest of the programme used for illustrative purposes (Table I) does not represent a core of courses common to all elementary majors. This programme allows for considerable variation in course selection among elementary education majors. To qualify for certification in this programme, the student must complete a major emphasis (54 credits) in one discipline (e.g., language arts, social studies, science, fine arts) or two minors (36 credits each), and a planned programme (30 credits) in general education.

One approach to be used here, is to list existing courses which cover the competencies in E.E. content and require that elementary majors include a minimum selection from this list. Selected courses should be allowed-to serve dual purposes where appropriate to the major or minor emphasis. If the analysis of existing courses reveals deficiencies, plans should be initiated to develop new courses or modify existing courses where appropriate.

Table II illustrates this procedure with courses taken from listings at Michigan State University.[1] In the example, Level I and II competencies could be provided for by existing courses. However, Levels III and IV are not adequately served by any of the listed courses. From conclusions drawn from this table, the following programme recommendations might be made.

1. Elementary majors must take one course from each group.

    (Level I)

    <u>Environmental Conservation Education</u>

    <u>Resource Ecology and Man</u>

    (Level II)

    <u>Resource Ecology and Man</u>

    <u>Conservation of Natural Resources</u>

    <u>Natural Resources and Modern Society</u>

    (Level III and IV)

    <u>Politics of Ecology</u> (modified accordingly)

    <u>Citizenship Action in Environmental Issues</u> (a new course
    developed at Levels III and IV).

2. The above courses may be used to satisfy other requirements in the elementary education programme where appropriate. For example,

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[1]Note this analysis of courses at Michigan State University did not involve the instructors, nor were the expected competencies refined to a functional degree. Therefore, this analysis is not necessarily an accurate description. However, Table II should serve the intended purpose of illustrating the process of analysis and curriculum planning.

Table Il. An illustration of the process of analyzing existing courses for inclusion in the Elementary Teacher Programme

| Competencies in EE Content | University Courses Available to Elem. Ed. Majors | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Environmental Conservation Education | Conservation of Nat. Resources | Land Economics | Water Resource Development | Politics of Ecology | Resource Ecology and Man | Energy Consumption and Env. Quality | Natural Resources and Modern Society | World Food, Population and Poverty | Geography of Environmental Quality | Ecological Basis for Planning |
| Level I (Ecological Foundations) | A | B | | B | | A | | | | | |
| Level II ...Cultural impact on environment ... | B | A | A | B | B | A | A | A | A | A | A |
| ...Individual behaviors impact... | B | A | B | B | B | A | A | B | A | | A |
| ...Existing environmental issues ... | A | A | A | B | A | A | B | A | B | A | B |
| ...Viable alternative solutions ... | B | A | B | B | A | A | A | A | B | B | A |
| ...Roles of human values ... | B | A | A | A | A | A | A | A | A | A | A |
| ...Need for responsible action... | A | A | A | B | A | A | A | A | B | B | B |
| Level III ...Knowledge and skills for issue investigation and evaluation ... | | B | B | B | B,C | | B | | B | | A |
| ...Ability to identify value perspectives in issues ... | | B | B | B | B,C | | B | | B | | B |
| ...Ability to identify alternative solutions ... | B | B | B | B | B,C | | B | | B | | A |
| Level IV ...Take positive environmental action ... | | B,C | | B | C | | C | | | | B |

A = Coursework contributes directly to this competency

B = Course contributes to the foundations required for this competency

C = Good opportunity for infusion

Environmental Conservation Education is a science course
(including laboratory) offered in the Department of
Fisheries and Wildlife. It could be used as an elective
course in the science major or minor programmes. In the
same manner, the other courses could be evaluated and used
where appropriate.

Further comment concerning the design of the new course
(Citizenship Action in Environmental Issues) seems appropriate here. If
the course is to achieve more than Level II (awareness) competencies, it
must involve more than a traditional lecture format. Students must be
capable of using the knowledge and skills as specified by Levels III and
IV. This mandates that students must be given an opportunity to partici-
pate in these processes.

One effective approach in this course would be to introduce and
model the component skills of environmental issue investigation and
actions using case studies. To be most effective, the case studies should
represent local, regional, national and international issues. The case
studies should incorporate and/or be followed by opportunities for pre-
service teachers to
investigate, evaluate and plan actions for environmental issues.

A summary of a preservice elementary education programme designed
to produce teachers who are competent in E.E. as well as other disci-
plines is presented below:

Environmentalized Preservice Elementary Education Programme
General Education Requirements

Credits

Humanities                      12
American Thought and Language    9

```
*Social Studies                     12
*Political Science Elective          4
American History Elective            4      (These courses may all
*Geography                           4      be considered as founda-
Human Growth and Development         3      tional to the development
*Developmental Psychology            4      of E.E. competencies to
*Biological Science                  4      some degree. Each of the
*Physical Science                    4      above courses may be en-
Mathematics                          4      vironmentalized. However
Language                             3      the course content of
English Literature                   3      some (*) may be more
Writing Workshop                     3      easily environmentalized.
Art                                  4
Music                                4
```

*Modified to maximize the use of course material as foundational to
 E.E. competencies.

Professional Education Requirements

Credits

```
Intro to Elementary Education        3
*Individual and the School           5
*Curriculum Methods and Materials    3
*Methods of Teaching Reading         3
*Teaching of Language Arts           3      (Heaviest infusion empha-
*Teaching of Social Studies          3      sis will be in Language
*Teaching of Mathematics             3      Arts, Social Studies,
*Teaching Science                    3      and Sciences.)
Methods in Environmental Education   3
Critical Reading and Children's Lit. 3
*School and Society                  5
Student Teaching                    15
Practicum in Developmental and
  Corrective Reading                 3
```

(*Modified for infusion.)

Major Emphasis (54 cr.) in One Area, or
    Two Minors (36 cr. each)

        Language Arts
        Social Studies
        Fine Arts
        Science
        Bilingual
        Urban Studies
        Foreign Language

<u>Environmental Education Requirements</u> (May be used to fulfill above requirements where appropriate.

Student will take one course from each group below.
```
      Environmental Conservation Education      4
      Resource Ecology and Man                  3


      Resource Ecology and Man                  3
      Conservation of Natural Resources         3
      Natural Resources and Modern Society      3


      Politics of Ecology                       3
      Citizenship Action in Environmental Issues 4
```

Secondary Education Programme

The same process may be applied to developing E.E. competencies in preservice secondary teachers. However, important differences exist between traditional secondary and elementary teacher training programmes. Secondary teachers are generally given considerably more depth in their major and minor areas of emphasis and less training in professional education foundations There are fewer «core» courses required of secondary education majors, and thus, there is more diversity in course selection.

To overcome this difficulty of diverse course selection, one approach might be for each major area (e.g., biological sciences, social studies, etc.) to analyze its programme for possibilities to infuse E.E. While this may theoretically be more desirable, pragmatically it is unlikely that <u>all </u>majors will have the commitment, facilities, and time to effectively «environmentalize» their curriculum. Therefore, addition of environmental education requirements to the curriculum may be necessary to guarantee development of E.E. competencies in preservice secondary educators. These courses should be essentially the same as those proposed for the elementary curriculum except that the E.E. methods course will be based on secondary

education methods.

A viable alternative to the E.E. methods course may be to increase credits and time allowed for the major teaching methods course (e.g., Methods in Science Teaching) and to include a large section which trains preservice teachers to achieve E.E. goals in their own discipline. The advantage of this would be a more relevant consideration of E.E. than would be possible if all majors were enrolled in the same E.E. methods course. An exemplary programme is presented below which includes both options:

```
    Environmentalized Preservice Secondary Education Programme
  General Education Requirements (60 credits)
  Teaching Major (45 credits)

  Professional Education Requirements
    Individual and the School
    School and Society
    General Teaching Methods
    (Major) Teaching Methods including E.E. methods
    E.E. Teaching Methods
    Psychology of Learning (Cognitive, Affective, Conative domains.)

Environmental Education Requirements (May be used in the above requirements)

Student will take one course from each group below.

    Environmental Conservation Education
    Resource Ecology and Man

    Resource Ecology and Man
    Conservation of Natural Resources
    Natural Resources and Modern Society

    Politics of Ecology
    Citizenship Action in Environmental Issues
```

Training the E.E. Specialist

At present there is a limited market for elementary or secondary teachers with a major emphasis in E.E. While professional environmental educators and other concerned individuals might prefer otherwise, the fact remains that few school systems in the world offer monodisciplinary E.E. courses which require E.E. specialists.

As discussed in the earlier chapter on Teacher Training Programmes, some universities in the world do offer E.E. major or minor programmes leading to certification of classroom E.E. specialists. At the undergraduate level, the more pragmatic approach may be that of an E.E. minor. This would provide the preservice teacher with marketable teaching skills in another discipline, while providing an opportunity to develope a strong E.E. emphasis. Such a teacher would be very effective not only in his/her own classroom, but as a resource person within the system for model teaching, team teaching, curriculum development, or (to some extent) teacher training.

Development of a preservice curriculum (major or minor emphasis) for the E.E. specialist would require components of the same procedure as outlined earlier. Course selection for the curriculum should be based on an analysis of expected E.E. competencies which may be developed by available courses. Courses must be included which provide training in competencies at all levels (educational foundations and E.E. content). The E.E. specialist will require a greater degree of competency at all levels than other-teachers.

Another type of E.E. specialist is the E.E. coordinator. The role of this specialist is more one of administrator or curriculum coordinator than of classroom teacher. If educational systems are to effectively achieve the goals of E.E., they will require a resource person to guide the

development and implementation of EVE. curricula, train classroom tea-
chers, and generally coordinate the efforts in this disciplinary field as
curriculum coordinators have done in other content areas.

An E.E. coordinator must possess the competencies outlined for the
classroom E.E. specialist in addition to being competent as an
administrator. University training programmes for E.E. coordinators
should be at the graduate level, since an E.E. coordinator must have
experience in teaching to fully maximize skills and knowledge in adminis-
tration and E.E. A graduate programme to train E.E. coordinators should
strive to achieve the same administrative competencies as those identi-
fied for any other disciplinary coordinator. In addition, the programme
must provide for any E.E. competencies in which the candidate has a defi-
ciency.

Infusing Environmental Education Into Teacher Training Programmes

Planning for Relevance

The Setting, Its Problems, and Possible Solutions.

Enormous gains could be made in worldwide environmental education (E.E.) if the philosophy, content, and spirit of E.E. could be infused into the existing framework of teacher education programmes. Interestingly, such an infusion could take place without compromising either the quality or goals of existing courses and programmes. In some instances, the quality of programmes could even be upgraded if attention was focused on the higher level processes involved in E.E., e.g., issue investigation and evaluation.

The very nature of E.E. - an interdisciplinary process aimed at solving local, regional, national, and international environmental problems, calls upon a plethora of common cultural skills and know-ledge, a variety of generic investigation skills, and a set of affective attributes known to many areas of human endeavor. The use of basic research skills, for example, is no more the stepchild of E.E. than it is of numerous other fields. Political, legal, and social processes involved in environmental issue solution are the very same ones involved in other areas of human endeavor. Values clarification strategies and moral development in E.E. are merely content specific applications of these generic processes. The citizen environmental action skills of persuasion, consumerism and others are simply generic sociocultural action modes applies to environmental issues. Very little in the realm of E.E. with respect to cognitive skills,

action skills, or affective processes belongs solely to E.E. This fact alone makes the potential for infusing environmental content into teacher education programmes almost unlimited.

One can envision a teacher education programme with environmental content infused into general education courses (i.e., liberal arts courses) such as earth science, biology, chemistry, economics, social problems, music appreciation, religious history, design, basic mathematics, communications, literature, and others. The same holds true for course work specifically designed for teacher education. Environmental content could be infused into a general classroom methods course, the student teaching experience, and special methods courses (e.g., science, math, social studies, language arts, music, industrial arts, and home economics). All of these courses/ experiences have elements in them which are eminently appropriate for the environmental content infusion process.

That which _is_ specific to the arena of environmental education is the content related to environmental problems per se (e.g., pollution, population problems, endangered species, wetlands management, etc.). Thus, E.E. is, in reality, a body of ever changing knowledge and situations to which the very generic processes and affective strategies are applied. Learners are simply applying elements such as problem solving and values clarification to environmental content. These information processing and attitude generating procedures could well be learned within the context of E.E. itself, or they could be learned in some other context. If learned in association with some other content, receivers must be taught to transfer these attributes to the environmental dimension. Although it is imperative that receivers learn this transfer process, the fact remains

that these processes and strategies are meaningful to E.E. only when applied to a problem topic associated with the environment.

Constraints to the Teacher Education Infusion Process

It is one thing to know how eminently appropriate the infusion of E.E. dimensions into teacher education programmes is and another to see this accomplished. Numerous limiting factors exist which pose serious constraints to the realisation of such an infusion. Among these are the traditional contents and methods utilized by teachers - even at the tertiary level - who tend to teach both what they had been taught and in the manner in which it had been taught to them. This very real condition probably exists even in some cases where instructors/professors have an affective predisposition toward using environmental content and strategies in their classes. It most certainly exists in many cases where there is no affective predisposition toward the environment and associated issues. Thus, habit and attitudes definitely impinge negatively on the infusion potential.

Certainly, other limiting factors also serve to impede the infusion strategy. Some of these are a lack of administrative interest or power, budgetary constraints, prescribed or dictated curricular thrusts in the student teaching experience, and a lack of environmental commitment among the preservice teacher population itself.

Overcoming these constraints is no easy matter. In many nations one finds tertiary educational systems thoroughly autonomous in terms of what shall or can be taught. In other nations one finds a prescribed curriculum, often without any semblance of an environmental dimension. These two separate conditions dictate separate strategies for overcoming obstacles to the infusion of environmental content and methods into existing course structures.

Where curriculum is dictated by the state or by a federal agency, or by an education office, etc., change is easier to accomplish _if_ the determining agency is sympathetic to an environmental infusion. In situations where curriculum suggestions can be made or pressures brought to bear, -sympathy toward change is more likely to occur when officials realize that the methods, skills, and strategies associated with E.E. are generic ones which can be taught and transferred to a variety of contents. Such an argument is both logical and easily developed. Much of this section focuses on both the principles and examples of this generalizeability. Where this argument fails, a plea can be made for the teaching for transfer of problem solving, values clarification, investigation, evaluation, and other skills being currently taught in the environmental arena. This argument is valid, however, only where the generic skills, methods, and strategies are actually being taught in tertiary education. Unfortunately, far too many education agencies proclaim the benefits of intellectual and affective processes and fail to provide for any real acquisition of same on the parts of the students.

In cases where decision-making is at the institutional level, the constraints which must be overcome differ sharply from those where decisions are superordinated from above. Here, local administrators and staff members must be brought to a conceptualisation of the critical need for E.E. and an attitude which predisposes them to implement or work toward such an infusion. Where this conceptualisation and predisposition already exist - even where additional training is needed - the problem is relatively simple. Where these characteristics do not exist, the problem is far more complex.

In situations where the need is conceptualised and the affect is appropriate, inservice staff education may be all that is needed. Such inservicing can be provided via institutional, regional, or national/ international funding.[1] Where instructor-backgrounds are relatively weak with respect to E.E., such training might need to be comprehensive. Where specific inservice needs are not comprehensive, a needs assessment can easily be accomplished prior to inservice instruction. In any event, ins-tructors should provide, where necessary, for the compentencies described in the previous section of this document.

In cases where staff autonomy exists and where staff members have not conceptualised a need nor reflect a predisposition toward infusing the environmental dimension, the problem is considerably more difficult. There is little hope of achieving maximum results in such a situation. However, a number of strategies can be employed to maximize the potential that actually exists.[2]

Recognizing that the initial problem is one of communicating a need and generating a positive set of attitudes, some workable strategy must be devised for accomplishing these goals. This strategy could well be an invitational conference supported by the institution itself, a regional education agency, or some other appropriate resource. This conference should be conducted by dynamic environmental specialists and instructors who are already infusing the environmental dimension into existing courses/ programmes. This conference should be largely concerned with the philosophy

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[1]Because particular circumstances will vary from nation to nation, exact recommendations cannot be made for funding sources.

[2]Other strategies relating to infusion and a multiplicity of other variables appears in a subsequent section of this document –
" Implenientation of Preservice EE Programmes "

Environmental Education Infusion Process Flow Chart - Tertiary Level
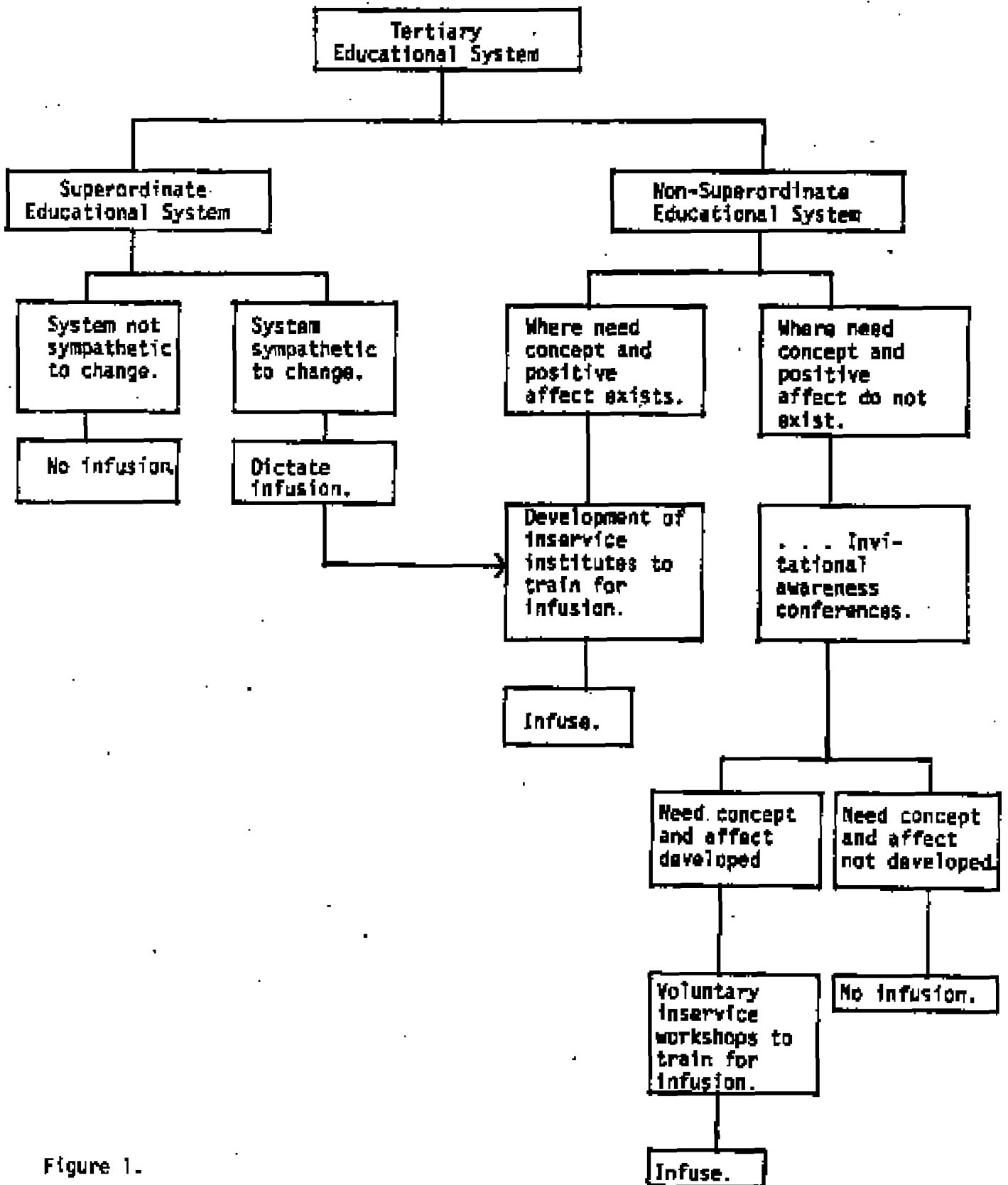


Figure 1.

of E.E. and the striking need for such education. Information concerning infusion strategies and proven successes should also be provided.

Out of the invitational conference could grow a voluntary inservice education programme for those instructors/professors desiring this. Any such programme should focus specifically on the needs expressed by the professionals attending it. Only in this way will interest and motivation be maintained. The use of some sort of professional reward/credit and/or monetary stipend is highly recommended.

Where possible a national or international strategy should be considered for gaining a conceptualisation of need and appropriate attitudes. A national or international agency could consider investing funds into tertiary institutes similar to those carried out by the National Science Foundation (USA) and the Department of Energy (USA). Such institutes could be two to six weeks in length and awarded to institutions developing written proposals best meeting the needs expressed by the funding agency. Tertiary instructors/professors coming to these institutes would be paid a stipend and receive professional credit for attending. Such a programme could develope hundreds or thousands o^ professionals ready and stilling to infuse the environmental dimension into existing general education or professional preservice teacher training courses.

In both of the preceding strategies (i.e. local or regional conferences and national or international institutes) care must be taken to provide for infusion implementation barriers identified by the participants themselves. Professional educators often have a propensity for looking more diligently at the problems than their solutions. Therefore some mechanism should be provided which will involve participants in an analysis process designed to meet and solve identified problems. A number of strategies exist which

Force Field Analysis Worksheet

What is the problem associated with infusion?

Problem statement:

What is the goal associated with infusion?

Goal statement:

What restraining forces are within me?

What driving forces are within me?

What restraining forces are within others?

What driving forces are within others?

What are the existing conditions?

(Considering such variables as time, money, manpower, physical setting, and others.)

Exactly what resources are available?

Need these:

Have access to these:

What are the actions available to solve this problem?

Which seems to be the most valid alternative action? Why?

What is the final strategy chosen for meeting the goal?

Figure 2.

and the extent to which affective components and strategies are interna-
lised. Processes and affective components should receive attention at an
adult receiver level. Issue investigations, for example, will be more
thoroughly accomplished at the tertiary level than at the middle school
level. Even so, the strategies associated with the investigation are
basically the same.

In educational methods classes, an additional component must be
considered. This component relates directly to the methodological strate-
gies recommended for the teaching of knowledge, skills, and attitudes.
Numerous methods components must be taught and analyzed (e.g., questio-
ning techniques, inquiry or problem solving methods, evaluation, etc.).
It is often productive for methods students to role play the receiver
population and actually experience the activity. However, when this tech-
nique is used, it is critically important for the students to analyze the
methods being used. The next step, of course, is for the methods students
to apply those same methods either in a peer group setting or in an ele-
mentary/secondary classroom on a practicum basis. In this way, practice
is gained and the tertiary instructor is in a position to evaluate the
acquisition of professional skills. Regardless of the strategies employed
by the tertiary methods instructor, the critical strategy is the one
which takes the preservice teacher beyond hearing about the method to
actually experiencing it.

Infusion Possibilities and Examples

This section will provide the reader with a number of infu-
sion possibilities and a few concrete examples of same. No
attempt is made to be exhaustive due to the scope of such a
task and the very real differences observable in tertiary gene-
ral education and professional teacher education programmes
throughout the world. Where concrete examples are provided, the

reader should be constantly alert -to strategies which could be employed for adapting that example to his/her own cultural setting. In some cases, quite likely, the example can be used as is.

## I. <u>General Education - Biological Sciences</u>

Needless to say, the biological sciences offer a splendid opportunity to teach ecological concepts. Because it is doubtful that many teacher education programmes will permit the tertiary receiver to take a course in ecology, the general biology courses become a viable option for teaching basic ecological principles. Similarly, environmental issues with direct biological implications could be logically dealt with (e.g., endangered species, population control, biological vs. chemical control of agricultural pests, management of salt water estuaries, wilderness preservation vs. multiple use, and feral dogs and cats). In addition, specific laboratory strategies could be taught which have direct application to environmental concerns (e.g., testing for biological oxygen demand, testing foe nitrates and other nutrients in water resources, using quadrats and transects, etc.).

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Infusion Activity No. I[1]

Activity: Field Observation: The Ecosystem Concept
Course: General Biology
Competency Level: Level I. Ecological Foundations, Communities and
               Ecosystems.

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[1]Adapted from Hungerford, H. R. and Peyton, R. B. <u>Basic Concepts in Ecology</u>. Unpublished instructional document. Southern Illinois University, Carbondale, Illinois.    1978.p. 3B-37.

(Note: This activity has been successfully used in both pre and inservice elementary and middle school workshops in the USA by the writers. It can be used as a preinstruction activity or as a field experience to introduce some basic ecological concepts. Participating teachers report that this activity assists them in conceptualisation during formal instruction.

Spacing between items on the worksheets has been reduced in the interest of conserving space in this document.)

Field Observation Worksheet: Ecosystem Concept

Intent of this activity:

It is always a good idea for introductory biology students to take a hard look at a living system in their area. An observation, data collection exercise such as this one will provide some clues to a few of the things that make a living system "work".

Procedures:

Travel to a living system that seems to be similar overall that exists in the region where you live. If it is a terrestrial environment, walk into it and spend some time just obse ving the things around you. Don't worry too much about the names of things in the environment. Instead, try to observe the system from a number of different perspectives. The questions which follow will help you focus your observation to the best of your ability. Note, however, that this activity will take more than a few minutes to complete.

Your Name _____

Date _____

1. What would you call this living system? Is it a hardwood forest? A vacant lot? A prairie? A temporary pond? A desert? Just what is it you are observing?

2. Do you believe that this environment is dominant in the region in which you live? In other words, is this an extensive living system in the region? Yes___No___. Provide your reasons for answering as you did.

3. Where is this living system located? Provide some evidence as to its location.

4. Can you identify the exact boundaries of this system? What might be some of the difficulties encountered in sharply defining the system's boundaries?

5. What are the general characteristics you see when you observe the overall character of this system? If a line drawing would help supplement your description, feel free to make one.

6. What are the non living (abiotic) variables that seem to be controlling the character of this system? For example, what might be the influence of topography? The bed rock? Humidity? Rainfall? Air temperature? Insolation? Etc.? How do these abiotic factors appear to be controlling the character of this living system?

7. What populations of plants and/or animals can you observe here? What is your evidence?

8. Living organisms may be referred to as «biotic factors». Can you

identify any biotic factors which seem to heavily influence the overall character of the system?

9. Is there any evidence that layering or zones of life exist in this particular system? If so, how would you describe them? If layers or zones exist, you may wish to sketch and label these.

10. Can you observe any evidence of competition between members of a given population, e.g., between red-winged blackbirds in a marsh? Yes____No____. If evidence exists, what is it?

11. Can you observe any evidence of competition between members of two different populations, e.g., between shingle oaks and swamp white oaks - or, between two different species of cacti? Yes____No____ . What is the evidence?

12. What other kinds of interactions between members of different populations can you observe here besides competition? For example, a fungus plant growing on a tree stump would be appropriate. How is each organism affected by the other?

13. What evidence exists, if any, to indicate that food energy flows through the system? If you can observe evidence of this and you want to diagram it, please do so.

14. What evidence exists, if any to indicate that this environment is more or less stable?

15. Some observers might want to apply the term «static» to this environment. The term «static» can be defined as showing little

change; lack of animation or progression; quiescent. How do you feel about applying the term «static» to this system? Please explain.

16. Does man play a role in this living system? Yes___No___What is the evidence?

17. Why do you think that it is appropriate to call this system . . . this forest . . . or pond . . . or whatever, an ECOSYSTEM? Think a bit about the term and the situation you are observing before answering.

18. (Respond to this only after completing Nos. 1-17 and when you return to class.) To what extent are your findings similar or different from those of other class members? In particular, how do other students feel about the answer to No. 17. Why.

II. Professional Teacher Education - Social Studies Methods Course

Because environmental issues are rooted largely in sociocultural values conflicts, the social studies provide an ideal atmosphere for in-fusing environmental topics. This condition seems verified as more and more social studies texts and tertiary methods textbooks contain sections or chapters on the environment, social issues related to the environment, or methods to be employed in teaching E.E. in the social studies class-room.

Social studies methods courses could easily provide for environmen-tal content by using issue-related topics in the teaching of simulation techniques, interdisciplinary instruction techniques and methods, field trip

techniques, using community resources in the social studies, issue/problem investigation and analysis skills, team teaching techniques (e.g., social studies and language arts), law education (e.g., environmental law and landmark decisions), citizenship responsibility education, consumer education, and others. Opportunities for infusing environmental dimensions into professional social studies methods courses seem relatively unlimited. As noted by Gross, et al. (1973),". . . environmental education poses a great challenge to the social studies teacher as well as other teachers from grades K to 12."[1]

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Infusion Activity No. II[2]

Activity: The President's Commission on Population - A Simulation.

Course: Social Studies Methods - Elementary or Secondary.

Competency Levels:      Level II. Conceptual Awareness, Cultural and Ecological Implications of Issues.

Level III. Investigation and Evaluation, Analyzing Environmental Issues and Associated Value Perspectives.

(Note: This simulation activity will probably need to be modified for use in cultures other than that of the USA. However, this simulation has been used with excellent

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[1]Gross, Richard E. et al. Social Studies for Our Times, New York, John Wiley and Sons, 1978. p. 312.

[2]This activity is adapted from one developed by Gertrude Volk and Harold Hungerford for use in undergraduate and graduate methods classes at Southern Illinois University at Carbondale. 1978. Unpublished.

results in North America.

In this simulation activity, one student (or the instructor) acts as moderator. Students can draw lots to determine positions simulated or they can volunteer for particular positions. Although minimal information is provided for the student (see examples below), positions should be thoroughly researched by the participants prior to the simulation activity.

A synthesizing and evaluation session should be conducted at the end of the simulation to further analyze the issue and its complexities.)

The President's Commission on Population - A Simulation

In the summer of 1981, the Presidential Commission on USA Population will hold hearings to determine governmental policy on population growth in the United States. The desired outcome of these hearings will be a determination of: (1) the extent of population growth in the USA; (2) factors leading to this growth; and (3) the most acceptable means of influencing the rate of growth if this is deemed necessary. You have been invited to appear before this commission. The goals of the hearings will be to: (1) hear testimony and other arguments on the population and its projected growth; (2) to determine the contributing factors to this growth; (3) to study the social and psychological implications of overpopulation; and (4) to determine the most acceptable means of influencing population growth (taking into account both ecological and cultural constraints involved in specific solutions).

Your role during the hearings will be to offer expert testimony and logical arguments reflecting your position to the Commission members. In order to present testimony and arguments in an equitable fashion and to maintain an atmosphere of mutual respect and acceptance, certain rules must be strictly adhered to. These rules are:

1. The order in which participants present their testimony will be determined by lot.

2. Each participant will be given the opportunity to present his/her position and explain it fully. Following this testimony, the floor will be opened to other members of the Commission and/or witnesses to the Commission.

3. During the discussion period, witnesses or commission members may participate only upon recognition by the moderator.

4. Comments and discussion on any particular issue will be limited to five minutes and may be curtailed at the discretion of the Commission Moderator.

At the close Of the session, an attempt will be made to reach a consensus of thought within the Commission, reflecting diverse positions, in order to present a recommendation to the President on a national population growth policy.

Positions Represented

Planned Parenthood                          Pro-Life Activist

Agricultural Expert                         Environmentalist

Economist                                   Zero Population Growth Rep.

Garret Hardin's Life Boat                   Social Psychologist
Position

Vatican Representative                      Immigration Expert

Protestant Representative                    Land Use Management Expert

Pro-Technology Representative                Others as needed


Example Position Descriptions


Example Number 1: Zero Population Growth Representative.


As a member of ZPG, you advocate US and world population stabili-
zation. Your concerns cover a wide range of issues, including population
growth, family size, immigration, teenage pregnancy, abortion and natio-
nal growth policy. You are concerned about pregnancies at all age levels
and in discussing teenage pregnancies, you have stated, «. . . much more
work needs to be done to educate teenagers and their parents on the pro-
blems related to teenage pregnancy and the availability of contraceptive
information, counselling, and services . . . Failing to act today only
compounds the high human, social, and economic costs to be borne by tee-
nage mothers, their children, and society in general.»

Your task is to develop a position to present to the Commission
which reflects ZPG's policies, not only regarding teenage pregnancies,
but also including immigration, fertility rates, and national population
growth.

Example Number 2: Garret Hardin.

You have written an article, comparing the world population pro-
blem to survival on lifeboats. Rich nations are lifeboats well-stocked
with supplies, and with only marginal space left. Poor nations are
overcrowded lifeboats with too little food. The ethics of the rich
lifeboat inhabitants should be to preserve the small amount of space
and the supplies remaining as a safety factor and to refuse supplies

and admittance to the occupants of the overcrowded, sinking lifeboats. This would necessitate a revision of existing immigration policies and the expulsion of all illegal aliens now in the United States. Your task is to generate a position to present to the Commission which is developed logically from your lifeboat analogy.

Example Number 3: Pro-Life Advocate.

As a pro-life advocate, you are against abortion in any instance, viewing it as the taking of a human life. It is your feeling that, in all of the uproar about the woman's rights over her own body, the rights of the fetus have been ignored. In handling an unwanted conception, your slogan is «Adoption, not abortion.» This means that the mother should carry the pregnancy to full term and then give the child up for adoption if she does not wish to raise him/her. Your task is to present the pro-life position to the Commission not only with regards to abortion, but also the implications on contraceptive practices fertility rate and population growth.

Example Number 4: Vatican Representative.

You represent the views of the Catholic Church. Although you recognize overpopulation as a serious problem (particularly in underdeveloped and developing nations where the associated hardships of starvation and disease often run rampant), you uphold the teaching of the Church regarding birth control, sterilisation, and abortion. You can invoke the papal encyclical, «Humanae Vitae» in your defense of this position.

III.   <u>Professional Teacher Education - General Methods of Teaching Course</u>

Almost all teacher education programmes include a general education methods course. This course is usually taught early in the professional education sequence and involves a number of information and skill areas. This course is largely introductory and may be followed with specialized methods courses in the preservice teacher's area(s) of specialization. Typically, more methods courses are employed for elementary teacher training than for secondary.

Regardless of whether the general methods course is for elementary or for secondary education majors, the course will often contain elements common to both areas. Common elements might include an introduction to learning theory, curriculum, inquiry models, planning for instruction, student evaluation, the use of performance objectives, individualisation and self-paced instruction, and affective education components such as values clarification. From these areas of concern come a number of situations suitable for the infusion of environmental content, e.g., the writing of performance objectives, investigation or problem solving strategies, individualised instruction, and affective education. Wherever the methods instructor utilizes content as a vehicle for teaching sound methods, environmental content could be employed.

Perhaps one or two specific examples would prove helpful. One of these could well involve the methods employed in the use of instructional models in education. A number of these exist, one being the General Teaching Model (GTM). The GTM involves four basic components, these being: (1) performance or behavioral objectives; (2) pretesting; (3) instruction; and (4) post evaluation. The interrelatedness of these four components is stressed as well as the need for syntactical organization, the application

of sound learning theory, etc. The methods instructor desiring to see this strategy applied following a lecture phase on the GTM could easily ask receivers to apply the GTM in an environmental context. The instructor could even request the cognitive or performance level at which the application was to be made, e.g., awareness, investigation, or citizenship action. The vehicle for said application could also be assigned, e.g., a case study approach, training in consumer action skills. Or, a list of acceptable levels and/or vehicles could be provided from which receivers could choose. A number of possibilities exist, each of which would successfully infuse environmental content into the methods course.

Another example might be the infusion of environmental content into methods training for values clarification strategies. Currently, many content areas are employed in instruction on values clarification. Some of these include behavior (self and group discipline), sex education, drug education, religious education, career education, family relationships, etc. Albeit the significance of many of the areas chosen for the application of values clarification, environmental concerns are highly appropriate for this process as well. Interestingly, the environmental dimension can sometimes be fused with other content, e.g., value clarification activities centering around human population problems also involve ancillary yet critical values dimensions concerning birth control, abortion, and religious beliefs. Here, the environmental dimension is only one of several which -impinge upon the issue. Thus, the values clarification activity need not be solely limited to the environment per se but can involve a number of critical human/cultural concerns.

In summary, general methods courses typically have many elements which prove highly appropriate for the infusion of environmental content.

The many infusion possibilities inherent in these courses should not be overlooked.

IV <u>General Education - Music Appreciation</u>

Many teacher education programmes include a course in music appreciation or the option for taking such a course. Because music appreciation might appear a bit unrealistic as a choice for infusion, it appears here as an example of the infusion process operating in an area that many would consider having little application to the environment.

A considerable amount of man's music - both popular and classical has environmental significance. Some of this music is largely aesthetic/ interpretive in nature and could be used at a conceptual awareness competency level. Excellent examples of classical works which could easily be infused into music appre-ciation courses include <u>The Grand Canyon Suite </u>by Grofe and the <u>Muldau</u> by Smetana.

More current popular music, ballads, and country and wes-tern music occasionally attempt to carry messages of concern about various aspects of the environment including specific issues, e.g., strip mining and land use management. An excellent example of music in this category is the song <u>Paradise</u> by John Prine. An abbreviated version of the lyrics follows:

>When I was a child, my family would travel
>Down to Western Kentucky, where my parents were born
>And there's a backwards old tour, that's often remembered
>So many times, that my memories are worn
>
>    Chorus:
>
>And daddy won't you take me back to Muhlenberg County
>Down by the Green River where Paradise lay
>Well I'm sorry my son, but you're too late in asking
>Mr. Peabody's coal train has hauled it away.

Then the coal company came with the world's largest shovel
And they tortured the timber and stripped all the land
Jell, they dug for their coal till the land was forsaken
Then they wrote it all down as the progress of man.

Chorus:


From <u>Paradise</u> by John Prine

Other titles (with recording artists) that have implications for infusion into music appreciation follow:

| <u>Title</u> | <u>Artist</u> |
|---|---|
| The Eagle and the Hawk | John Denver |
| Rocky Mountain High | John Denver |
| Calypso | John Denver |
| Big Yellow Taxi | Joni Mitchell |
| Child Song | Neil Diamond |
| E1 Condor Pasa | Simon and Garfunkel |


An interesting project in a general education music appreciation course or a professional music education methods course would be to ask receivers to write lyrics and/or music for an environmental ballad. In this way, receivers would be investigating the conditions associated with an issue in order to-translate those conditions into music.

V. <u>Professional Teacher Education - Mathematics Methods Course</u>

Sidney Sharron and Robert Reys (1979)[1] speak pragmatically about a major difficulty in the teaching of mathematics applications to children and adolescents when they state:

> The vastness and depth of anpropriate applications generate a
> feeling of uneasiness for many mathematics teachers. Preparing
> to teach mathematics makes demands on a sizeable share of one's

[1]Sharron, S. and Reys, R. (Eds.). <u>Applications in School Mathematics</u>, Reston, Virginia, The National Council of Teachers of Mathematics, Inc., 1979. P. 149-158.

formal education, leaving little or no time for comprehensive experiences in areas where real-life applications in mathematics abound. A lack of such experience may inhibit a mathematics teacher from veering off from the abstract or pedantic to the practical or serviceable areas of mathematics.

Should a serious attempt be made to infuse environmental content into the teaching of mathematics to children and adolescents (and, thus, to pre and inservice teachers in math methods classes and workshops) the results could be available. Further, this content ranges from that needing very simple math skills to content demanding high school and college-level applications. then one considers the vast potential from the energy area alone, the possibilities seem endless. In addition, there are many possibilities for math applications in population dynamics and distributions, wildlife management, consumer practices, minerals utilization and conservation, food production and distribution, and many, many others.

One excellent example of sample infusion strategies for mathematics has been developed by Thiessen and Wild (1979) in an article entitled, "applying Mathematics to Environmental Problems."[1] In this writing; they propose a number of story problems for young learners using environmental problems as the content. Problems infused include human population, paper consumption returnable vs. disposable soda pop containers, food packaging, fast-food energy consumption, littering, conserving Gasoline, and home heating fuel conservation. One of these, that dealing Faith human population models, is presented below in an abbreviated form.

---

[1]Thiessen, Diane and Wild, Margaret. «Applying Mathematics to Environmental Problems.» In: Sharron, S. and Reys, R. (Eds.). Applications in School Mathematics, Reston, Virginia, The National Council of Teachers of Mathematics, Inc., 1979. p. 149-158.

Infusion Activity No. III

Activity: A Comparison of Population Growth Models (No Title in
the Original Form).

Course: Elementary or Piddle School Math Methods.
Competency Levels:  Level II. Conceptual Awareness, Impact of
Individual Behavior.


(Note: This set of story problems was written by Thiessen and
Wild and cited in this section. It is particularly interesting
to note that these writers nave generated story problems for
use in mathematics which go beyond the simple application of
math skills. Coupled with these problems are questions which
probe the receivers' values and search for alternative solu-
tions to issues used in the problem.

It is recommended that teacher educators incorporate
these and other easily developed environmentally-related
mathematics applications in the teaching of math methods. In
this way, the pre and inservice teacher will feel comfortable
with the strategy when he/she enters his/her own classroom.)


The Activity


1(a) Once upon a time eight couples got together and establi-
shed a very small community. Each of these couples had two chil-
dren, mating a total population of_____ . As the years passed,
the children grew up, married within the community, and each of
these couples had two children. The total population was
now_____.

This still put no strain on the community's space or resources. There was plenty for everyone, and the resources could be renewed at a rate to sustain this population indefinitely. The people in the community lived together very happily. No one moved in or out of the community. Everyone married, and each of the couples had two children. Each generation had equal numbers of boys and girls. As great-grandchildren were born, great-grandparent; died of old age, but no one died of anything else. Draw a diagram of this community to the fourth generation. By the time the fourth generation is born and the first has died, how many people live in the community? ashen the fifth generation comes along (remember that the second dies), what will the population be? What will the population be at the tenth generation? The twentieth? The two hundredth?

l(b) Another community was established at the same time, identical in all respects but one: the founding couples decided that the community's abundant resources would permit each couple to have three children. When these children grew up and married, naturally they had three-child families, and so on. How many people were there in the first three generations? By the time the fourth generation is born and the first has died, how many people live in the community? When the fifth generation comes along, what will the population be? The population capacity for the space and resources of the community is 1000. In which generation will this capacity be exceeded? If technological advances suddenly double the capacity, in which generation will this new capacity be exceeded? If additional technological advances double the capacity again, in which generation will this be exceeded?

l(c) Using two different colors, draw bar graphs of both populations. (Older children could draw line graphs.) If you were a member of the first generation, in which community would you rather live? Why? If you were a member of the tenth generation, in which community should you rather live? ashy? If you were a member of the fifteenth generation, in which community would you rather live? ashy? (rote: In the second community the problem will eventually arise of what to do, in a generation having an odd number of children, about the person echo will have no marriage partner. One solution would be to assume that this person lives to the same age as others of that generation but does not marry or have children. Students should try to think of other possible solutions and discuss how these solutions would have different effects on the number of people living in the community at any one time.)

VI. Professional Teacher Education - Home Economics Methods Course

Many home economists and home economics methods instructors are already environmentalizing their instructional programs. These professionals, by and large, know the value of conservative consumer behavior and energy conservation. Many environmental applications are suitable and justified in home economics in areas associated with family planning, housing, food purchase and preparation, clothing, grooming of self and children, and overall energy efficiency. A myriad of environmentally-related content and activities are potentially available for use in this area. Infusing E.E. into home economics is a relatively simple task.

Regardless of the ease with which E.E. can be infused into home economics, professionals must realize that home economists will maximize E.E. in their many programs only when trained to do so. Therefore, they should receive training specifically oriented toward the infusion process and experience many of the activities they would, in turn, share with their receivers.

The activity found below is presented here in order to demonstrate one of the many experiences available for home economics receiver groups. This activity is one adapted from Energy Conservation in the Home, published by the U.S. Department of Energy in 1977.[1] The reader still be quick to ascertain that this activity could be infused, equally well, into a number of other content areas, e.g., agriculture, science, and landscaping.

Infusion Activity No. IV

Activity: Energy Conservation Vegetation Survey.
Course Junior or Senior High School Home Economics Methods.
Competency Level:    Level III. Investigation and Evaluation Level,

                            Participate in Investigation and
Evaluation.

   (Note: It would be desirable to use this activity subsequent
   to at least introductory instruction on the impact of vegeta-
   tion on energy consumption and human comfort. In all cases,
   students should inspect the values represented by or associa-
   ted with their survey findings and compare these

   [1]Energy Conservation in the Home: An Energy Education/Conservation
Curriculum Guide for Home Economics Teachers. Technical Informa
 tion Center, Oak Ridge, Tennessee, U.S. Dept. of Energy, 1979.319 p.

against energy conservation and ecologically-desirable values.
If problems are identified, alternative solutions should
also be identified and evaluated.)

The Survey Activity

Trees and plantings are often leveled in an area prior to
school building or residential development with little regard
for their economic and esthetic values. The trees, shrubs,
ground covers, vines, and flowers temper the impact of sun and
wind on the home and school. Vegetation can shield a home or
school from unwanted sun and wind, but still admit desirable sun
and breezes. Because of the angle of the sun and the effects of
seasonal changes, most homes and schools need protection from
the sun during summer on the south, west, and east sides1 and
protection from wind during winter on the north side (North
America). Of course, there are regional variations. Investigate
the N. S. E, and h sides of your home and school and determine
if the vegetation is beneficial and where additional vegetation
is beneficial and where additional vegetation is needed. Make
your comments in the space provided.

HOME                                          SCHOOL

NORTH SIDE:

Trees:  _____    _____

_____    _____

_____    _____

Shrubs:  _____    _____

_____    _____

_____    _____

| Home, cont. | School, cont |
|---|---|

Does the vegetation make a good

wind shield? _____        _____

SOUTH SIDE:

Trees: _____        _____

_____        _____

_____        _____

Shrubs: _____        _____

_____        _____

_____        _____

Does the vegetation make a good

sun shade? _____        _____

WEST SIDE:

Trees: _____        _____

_____        _____

_____        _____

Shrubs: _____        _____

_____        _____

_____        _____

Does this vegetation offer any form

of environmental protection?_____        _____

(REPEAT FOR THE EAST SIDE)


Questions and Suggestions:

1. Does it appear as though either your home or the school
needs additional vegetation plantings in order to maximize human
comfort and energy conservation? If so, what suggestions could
you make in order to accomplish this?

2. If your class agrees they are needed, make recommendations to the school administration for additional plantings.

3. Invite a landscape architect or nurseryman to your class to discuss different types of vegetation and their effects on heating and cooling needs.

VII . General or professional Education - Language Arts or Language Arts Methods Courses

The language arts (LA) hold phenomenal promise for infusing environmental content. When one considers the cognitive/investigative skills used in E.E. and their relation to the language arts (EA) as well as the environmentally-related literature that is available, many excellent infusion possibilities come to mind.

An inspection of E.E. programmes intent on developing issue investigative skills reveals a number of language arts-related skills which, if taught in either general education LA or LA methods classes, could easily use environmental content. One such programme focuses on training middle and secondary school students in the processes associated with issue investigation.[1] In Module II of this program, a number of specific performance objectives appear which have a language arts emphasis. Among these are:

Upon completion of Module II, the student will be expected to be able to . . .

1. . . . . compare two information sources about coal reserves and identify the important data (information, values, value positions) in each source and communicate how these data differ.

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[1]Hungerford, H. R. et al. Investigation and Action Skills for Environmental Problem Solving. Champaign, Illinois, Stipes Publishing~Co., 1978. 166 p.

2. . . . read tsar environmental news articles and state at
     least
two differing value positions as expressed in each article.

3. . . . locate and read one environmentally-related article
approved by your instructor and write a brief summary which
     accu
rately communicates the main point(s) presented.

4. . . . correctly identify the written information (and sym
bols) used on a card from the card catalog.

5. . correctly identify the Written information (and symbols)
used in a reference from the Readers' Guide.


6. .. analyze a research report dealing with polar bear man
agement and . . .

     a. cite one source of information to Which the author
     might have written for more information.

     b. explain why the author was unable to answer one of the
     questions asked in the report.

     c. determine the author's values toward polar bear manage-
     ment.

     d. state specifically why you consider (or do not consi-
     der) the research report to be a good, thorough job of
     covering the subject.


Among the language arts skills associated with these objectives

are critical reading for information, locating references, wri-

ting summary statements, and evaluating documents for specific

purposes. Similar objectives are often associated with LA ins-

truction at tertiary levels and only the level of competence

differs. The content could remain basically the same or be

adjusted as needed.

   In addition, all communication skills so often emphasized in

elementary, secondary, and tertiary instruction in LA could be

taught using environmental content. Persuasive arguments are criti-

cal to issue perspectives and value positions. Debate is often cru-

cial to issue investigation and evaluation. Listening skills are

important in order to avoid emotional bias and carefully evaluate

incoming stimuli. Public speaking skills often have great impact on

an environmentally-interested receiver group. Writing skills are

of equal or greater importance when attempting to communicate issue Positions. All of these skills, where taught at the tertiary level, could carry a distinct environmental flavor. Further, in LA methods classes, the methods Of teaching communication skills could easily focus on using environmental content.

Literature abounds with both professional and aesthetic documents dealing with the environment in its many facets. come of this literature is reputed to be of superior quality. LA instructors could, if their specific objectives warranted it, use the literature of Aldo Leopold or Rachel Carson for analysis. Other writers that could be considered for LA literature infusion include Marsten Bates, Barry Commoner, John H. Storer-, Fairfield Osborn, Peter Farb, Durszard Allen, Willy Ley, Garrett Hardin, Rene Dubos, and Paul R. Ehrlich. Of course, these writers represent a Wide variety of subjects and perspectives and must be considered in that context.
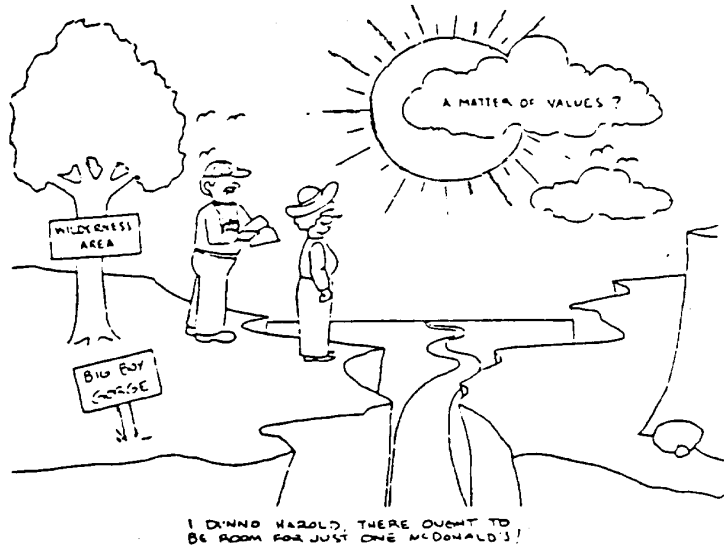
Figure 3 (above and below). Cartooning with an environmental emphasis Such cartooning, accomplished in a general education art or art methods class could be both fun and educationally rewarding. In addition, preservice teachers are much more likely to use such a strategy in their own classrooms when they have experienced it themselves. Cartoons from Hungerford et al. Investigation and Action Skills for Environmental Problem Solving. Champaign, Illinois, Stipes Publishing Company, 1978.

Other Possibilities and Summary

The infusion possibilities noted in the prior section comprise only a smell sample of the enormous potential for infusing E.E. content into both general education and professional teacher education at the tertiary level. Many other content areas hold considerable promise for such an infusion. Among these would be economics, agriculture industries, chemistry, design, forestry, the earth sciences, journalism, and engineering. Other areas hold substantial promise for the infusion of E.E. content and these include (but are not limited to) art, cinema and photography, health education, philosophy, psychology, and radio and television.

It is highly unlikely that all of the above areas would be environmentalized equally at a particular institution at a given point in time. Even so, a substantial infusion into even a few of these areas could produce significant results with respect to awareness and environmentally-compatable values. In some instance, receivers would most certainly gain environmental action skills and be able to work individually or collectively toward the remediation of many environmental problems both large and small.

Of critical concern in this whole discussion is the infusion of environmental content into existing professional teacher training programmes. It is within these programmes that future teachers gain insights into the content they will teach as well as the methods they will use in their own classrooms. Preservice teachers are, likewise, very adept at model ing the behaviors they observe in their own professional education training. In order to capitalise on this prevalent mimicry, professional teacher educators must utilize the environmental content and model the methods desired in the elementary and secondary classrooms in which their students will

teach. This modeling behavior may well be the most fruitful of all available strategies. Certainly, if the course cannot, for one reason or another, be environmentalized, it behoves teacher educators to make certain that their receivers thoroughly understand and can apply the principles associated with transfer. If this is accomplished, the preservice teacher may be able to utilize learned skills and methods in an environmental context.

The infusion process, overall, is not an easy one to accomplish. Many stumbling blocks lie in the path of those attempting to environmentalize tertiary general and teacher education. However, strategies are available for overcoming obstacles and some of these have been described in this and a subsequent section of this chapter. Regardless of problems associated with the infusion process, the potential victories are genuine and important enough to make working toward this goal extremely worthwhile.

Methods Courses for Professional Education
Elementary and Secondary

Introduction

The environmental education (E.E.) methods course is cru-
cial to programmes attempting to train fully competent environ-
mental educators. The development of such a course is no easy
matter due to the tremendous interdisciplinary nature of E.E.
and because few methods books are available to assist the course
developer.

The methods course developer also faces weighty responsibi-
lities in an era where E.E. is beginning to take on new meaning
with respect to involving receivers in issue analysis, evalua-
tion, and citizen roles in the remediation of issues. No longer
can a methods instructor feel comfortable teaching a course
limited to an awareness of problems and strategies associated
with teaching for awareness. Receivers must be given skills and
competencies to take them beyond awareness to a higher plateau
of autonomous citizenship behavior. Only by involving receivers
thusly is there any real hope of observing a transfer of needed
environmental behaviors from the classroom to cuunity living.

This section outlines a skeleton of a methods course which
attempts to accomplish the tasks noted above. In no way is this
outline complete as it appears here. It is, instead, a frame-
work of the structure of a methods course which could help
develope competent environmental educators. The basic components
exist in the outline but it remains the task of the course

developer to translate discrete components into performance objectives, activities, assignments, and evaluation instruments. However, there do appear elsewhere in this document Many goals, objectives, guidelines, activities, and methods which would aid measureably in this task. In addition, many excellent references appear in the bibliography which Would also assist the developer.

The outline appearing below consists of five major elements: (1) a topical listing of major headings for the methods course development complete with (2) a listing of content components recommended for inclusion within each topical heading and (3) a list of very basic sample instructional recommendations to be utilized in integrating the content. Also, (4) the reader will find two columns which indicate whether these content components and the instructional recommendations belong in an elementary methods course, a secondary methods course, or in both. Further, (5) each methods component is referenced to a previous section on competencies required of an effective environmental educator (pages 28-37).

METHODS COMPONENT I. PHILOSOPHY.

*Focus: E.E. Competency Number 1*

| Content | Course Level | |
|---|---|---|
| | Elem | sec |
| 1. The need for E.E. - locally, regionally, nationally, globally. | X | X |
| 2. The logic behind a holistic view of the environment which looks not only at ecological principles but also at man as a culturally-contributing activist - either positively, negatively, or passively. | X | X |
| 3. The goals of E.E. as endorsed by the world's first Intergovernmental Conference on Environmental Education (14-26 October 1977, Tbilisi, Georgia, USSR) sponsored by Unesco in cooperation with UNEP. These goals of environmental education are: | X | X |
|     A) to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas; | | |
|     B) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; | | |
|     C) to create new patterns of behavior of individuals, groups and society as a whole towards the environment. | | |
| 4. The differences (and similarities where appropriate) of E.E., conservation- education, outdoor education, outdoor recreation, ecology, and nature study (natural history). | X | X |
| 5. The role of experimentalism in E.E., i.e., the critical need for receivers to be active problem solvers in E.E. | X | X |
| 6. The need for highly skilled teachers in E.E. | X | X |

### Sample Instructional Recommendations

| | Elem | sec |
|---|---|---|
| 1. Assigning «The Tbilisi Declaration» to be read by all receivers (vol. III, no. 1, January 1978, Connect, pp 1-8.) | X | X |
| 2. A review of the educational philosophy known as experimentalism and its role in providing for citizen training and experience in investigation and problem solving. | X | X |

| | Elem | sec |
|---|---|---|
| 3. An analysis of the differences between ecology and E.E. as well as the critical relationships existing between them. An analysis of similarities and differences between other, often-confused areas of educational concern. | X | X |
| 4. Utilize group discussion to analyze a particular environmental issue in order to impress upon receivers the ecological, economic, political, and social implications of the issue, i.e., its interdisciplinary nature. | X | X |
| 5. Assigning receivers to identify and analyze a variety of human behaviors and categorize said behaviors as environmentally positive, negative, or passive. | X | X |
| 6. An introduction of the role of the teacher of E.E. the demands placed on a teacher competent to deal with the interdisciplinary nature of the content and processes involved. | X | X |

METHODS COMPONENT II. THE LEARNER AND E.E.

*Focus: E . E . Competency Numbers 3, 4, 5, and 6*

Course Level

<u>Content</u>

| | Elem | sec |
|---|---|---|
| 1.Consideration of both physical and intellectual development in the planning of E.E. experiences for receivers. | X | |
| 2. Characteristics of cognitive knowledge with special emphasis on concept development. | X | X |
| 3. Characteristics of cognitive process, i.e., intellectual skills such as inferring, hypothesising, data collection and analysis, drawing conclusion, etc. | X | X |
| 4. Characteristics of attitudes and values. | X | X |
| 5. Relationships existing between knowledge, skills, values, and human behavior. | X | X |
| 6. Principles associated with transfer of learning and implications for E.E. | X | X |
| 7. Implications of special student populations for E.E., e.g., disadvantaged, gifted, disabled, etc. | X | X |

### Sample Instructional Recommendations

| | | |
|---|---|---|
| 1. An analysis of existing E.E. curricula by receivers, to determine the curriculum materials consistency With accepted learning theory (e.g., Piaget, Bruner, Gagne') | X | X |
| 2. Lecture or assigned readings on characteristics of cognitive knowledge, cognitive processes, and affective components including actual E.E. experiences illustrating development of these components. | X | X |
| 3. Lecture or assigned readings on the relationships which exist between knowledge, values, and human behavior. Special emphasis given to critical E.E. irnplications. | X | X |
| 4. Lecture and discussion on transfer of learning and critical E.E. implications. | X | X |
| 5. Lecture on special populations and E.E. with subsequent emphasis on a review of E.E. materials developed for or usable svith special populations. | X | X |

METHODS COMPONENT III. CURRICULUM DEVELOPMENT IN E.E.

*Focus: 7.E. Competency Numbers 8 and 9*

### Content

Course Level

| | Elem | sec |
|---|---|---|
| 1. Key foundational components to be considered for curriculum development in E.E. - prerequisites to effective environmental education including critical ecological concepts and sensitivity to the environment. | X | X |
| 2. Goals - by level - for curriculum development in E.E.: | | |
| A) The conceptual awareness level including theimpact of both cultural and individual activities on the environment, critical issues in the environment, alternative solutions to issues, the need for issue investigation and evaluation, the role of human values in issues, and the need for responsible citizenship action with respect to issues. | X | X |

---

1 The goals used for this and subsequent examples may be found in Hungerford,H.R.; Peyton, R.B. Developing an Environmental Education Curriculum. Paris, UNESCO 1980. Similarly these goals are operationalized as competencies in a prior section of this document, p. 28-37.

| | | |
|---|---|---|
| B) The investigation and evaluation level including the knowledge and skills necessary to identify and investigate issues, the ability to identify and evaluate alternative solutions, the ability to participate in values clarification, and the ability to modify values in light of never information. | X | X |
| C) The environmental action skills level including citizenship action skills, the ability to make decisions concerning action strategies, the ability to evaluate actions with respect to their impact on issues. | X | X |
| 3. Analyzing goal components With respect to developing performance objectives needed in curricular packages/programmes. | X | X |

## Sample Instructional Recommendations

| | | |
|---|---|---|
| 1. Lecture and discussion concerning the role of prerequisite/foundational components for E.E. and the methods associated With bringing receivers to an appropriate criterion in these areas. | X | X |
| 2. Assigned readings with detailed group analysis of goals for curriculum development in E.E. | X | X |
| 3. Simulating the application of the goals through the preparation of performance objectives intended to meet one or more of the goals. Outlining instructional strategies designed to produce the desired behaviors. | X | X |
| 4. Inspection of one or more curricular packages/programmes which have effectively applied the goals by level and/or an evaluation, by receivers, of the extent to which existing curricular packages/programmes meet the goals specified for curriculum development in E.E. | X | X |

METHODS COMPONENT IV. CURRICULUM MODELS

*Focus: E.E. Competency Numbers S. 9, and 10*

Course Level

<u>Content</u>

| | Elem | sec |
|---|---|---|
| 1. Advantages and disadvantages of E.E. as a mono-disciplinary curriculum, i.e., one course, typically taught by one instructor. | X | X |
| 2. Advantages and disadvantages of E.E. as an infused, interdisciplinary curriculum, i.e., infusing environ-mental content into existing content areas throughout the school. | X | X |
| 3. Problems and strategies associated with the imple-mentation of an infused environmental curriculum. | X | X |
| 4. Problems and strategies associated with the evalua-tion of an infused environmental curriculum. | X | X |
| 5. Case studies illustrating successful E.E. programmes fitting both monodisciplinary and interdisciplinary patterns. | X | X |

<u>Sample Instructional Recommendations</u>

| | | |
|---|---|---|
| 1. Readings (and/or lecture) with subsequent discussion concerning both implementation and evaluation strate-gies and problems. | X | X |
| 2. Use the nominal group problem solving technique with receivers to identify advantages and disadvantages of the monodisciplinary and infused curriculum models. | X | X |

METHODS COMPONENT V. PREPARING FOR INSTRUCTION.

*Focus: E.E. Competency Plumber* s

Course Level

### Content

| | Elem | sec |
|---|---|---|
| 1. Rationale for using a syntactically sound instructional model, i.e., where objectives relate to goals, where instruction relates to objectives, and where evaluation relates to instruction. | X | X |
| 2. The general teaching model and permutations of that model, i.e. the combination of performance objectives, preassessment, instruction, and postassessment. | X | X |
| 3. Strategies involved in the production of objectives, pretests, instructional sequences, and posttests. Alternative patterns of instruction and evaluation which function effectively within the general teaching model. | X | X |

### Sample Instructional Recommendations

| | Elem | sec |
|---|---|---|
| 1. Lecture and discussion on the theoretical premises involved in the general teaching model and variations of it. | X | X |
| 2. Use the teaching of the E.E. methods course to model for receivers, instruction which consistently applies the general teaching model's elements. Review prior course instruction to assess its compatibility with the general teaching model. | X | X |
| 3. Provide receivers with opportunities to plan instructional sequences using objectives written in Component III of this section ordevelope instructional packages designed to meet goals other than those used in Component III. | X | X |
| 4. Provide receivers with opportunities to share newly created instructional packages and to evaluate the validity of these packages with respect to both the goals involved and the general teaching model. | X | X |

METHODS COMPONENT VI. METHODS OF TEACHING AWARENESS.

*Focus E.E. Competency Number 7, 15, 16,*

| Content | Course Level | |
|---|---|---|
| | Elem | sec |
| 1. Awareness goal level and associated goal statements.[1] | X | X |
| 2. Research related to awareness education and the implications of this research for E.E. | X | X |
| 3. Teaching methods appropriate for use in awareness instruction including (but not to be limited to): | $X^2$ | X |
|     A) case study analysis | | |
|     B) simulations | | |
|     C) panel discussions/formal debate | | |
|     D) outdoor experiences including the field trip | | |
|     E) films and other audio-visual modes. | | |

#### Sample Instructional Recommendations

| | Elem | sec |
|---|---|---|
| 1. Assigning awareness research reports/articles to be read and critiqued by receivers in a seminar setting. Followed by synthesizing discussion. | X | X |
| 2. Lecture and discussion relative to various teaching methods appropriate to awareness goals. | X | X |
| 3. Model one or more awareness strategies for receivers. | X | X |
| 4. Provide receivers with opportunities to apply awareness strategies in either a peer group setting or with other receiver groups and co.:paratively evaluate the success of the methods used. | X | X |

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[1] See footnote 1, page 91.

[2] It should be noted that the use of particular strategies is highly dependent upon grade level and the nature of the learners. Although the strategies listed here could, in some instances, be used at both elementary and secondary levels, their use-should not be considered generic to all grade levels.

METHODS COMPONENT VII. METHODS OF TEACHING INVESTIGATION SKILLS.

*Focus: E.E. Competency Numbers 22, Z3, 24, 25, 26, and 27*

| | Course Level | |
|---|---|---|
| <u>Content</u> | Elem | sec |
| 1. Investigation and evaluation goal level and associated goal statements. | X | X |
| 2. Research related to investigation and evaluation education and the implications of this research for E.E. | X | X |
| 3. Teaching methods appropriate for use in investigation and evaluation skill development as well as those methods appropriate ashen receiver groups are asked to apply those skills. | X[1] | X |

<u>Sample Instructional Recommendations</u>

| | Elem | sec |
|---|---|---|
| 1. Assigning research reports/articles to be read and critiqued by receivers in a seminar setting. Followed by a synthesising discussion. | X | X |
| 2. Lecture and discussion relative to various teaching methods appropriate to investigation and evaluation goals. | X | X |
| 3. Model one or more strategies that could be utilized in the skill development phase. | X | X |
| 4. Model one or more strategies that could be utilized in the application phase. | X | X |
| 5. Provide receivers with opportunities to apply investigation and evaluation teaching methods at both the development and application phases. | X | X |

---

1 Although all investigation and evaluation skill components can be taught at both elementary and secondary school'levels, the acquisition and use of these skills varies from grade level to grade level.Similarly, some skills cannot be taught to or utilized by young elementary school receivers. These conditions must be considered in the development of the methods course.

METHODS COMPONENT VIII. METHODS OF AFFECTIVE EDUCATION.

*Focus: E.E. Competency Numbers 2, 3, and 7*

| Content | Course Level | |
|---|---|---|
| | Elem | sec |
| 1. Goal components which have applicability to affective education, e.g., goals dealing with values clarification. | X | X |
| 2. Benefits of affective education and common objections raised concerning the use of values clarification and moral education strategies. | X | X |
| 3. Research related to affective education and the implications of this research for E.E. | X[1] | X |
| 4. Teaching strategies appropriate for use in affective education including knowledge based strategies such as case studies and issue position simulation activities, episodic/situational values clarification activities, moral dilemmas, value continuums, etc. | X | X |
| 5. Performance characteristics of an effective affective teacher. | X | X |

<u>Sample Instructional Recommendations</u>

| | Elem | sec |
|---|---|---|
| 1. Review of curriculum development goals focused on affective education components. Similarly, a review of the relationships existing between knowledge, skills, attitudes/values, and human behavior. | X | X |
| 2. Assigning research reports/articles to be read and critiqued by receivers in a seminar setting. Followed by a synthesizing session which focuses on the implications of this research for E.E. | X | X |
| 3. Lecture and discussion on strategies which can be employed in affective education followed by the instructor modelling one or more of these strategies. | X[1] | X |
| 4. Receivers developing values clarification activities and using these activities in peer group situations or with other receiver groups. Or, using appropriate existing activities with other receiver groups. | X | X |

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1 These strategies would, of course, differ considerably from early elementary to secondary education. These differences would have to be carefully considered in the development of a methods course.

METHODS COMPONENT IX. METHODS OF TEACHING CITIZENSHIP ACTIONS S. ILLS.

*Focus: E.E. Competency Number 28*

<u>Content</u>

| | Course Level | |
|---|---|---|
| | Elem | sec |
| 1. Goal components associated with citizenship action training and application. | X | X |
| 2. Research Which has been conducted relative to environmental action skills training and environmental action competencies of teachers - the implications of this research for E.E. | X | X |
| 3. The model of environmental action including modes of action, levels of action, and criteria for selecting specific actions. | X | X |
| 4. Teaching strategies appropriate for the teaching of: | | |
|    A) persuasion skils    . . . . . . . . . | X | X |
|    B) consumer skills.    . . . . . . . . . | X | X |
|    C) political action skills.   . . . . . . . . . | X | X |
|    D) legal action skills .    . . . . . . . . . | | X |
|    E) ecomanagement skills .   . . . . . . . . . | X | X |
|    F) combinations of A through E.  . . . . . . . . | X | X |
| 5. Applying and evaluating citizenship action strategies with receiver groups. | X | X |

<center><u>Sample Instructional Recommendations</u></center>

| | | |
|---|---|---|
| 1. Review of curriculum development goals associated with environmental action training and application. | X | X |
| 2. Lecture and discussion (or selected readings and discussion) covering that research which has been conducted relative to citizen action. Subsequent discussion on the important implications of this research. | X | X |
| 3. Lecture and discussion relative to the environmental action model including coverage of the skill components associated with each mode of action. | X | X |

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    1 A more complete description of the modes of action, levels of action, and criteria for selecting specific actions can be found in Hungerford, H.R.; Peyton, R,B., <u>Teaching Environmental Education.</u> Portland, Maine (USA), J. Weston Walch Co., 1976.

4. Use the nominal group technique to allows receivers to generate appropriate criteria for evaluating and selecting environmental actions.

5. Group analysis of a given environmental issue for the purpose of evaluating that issue in terms of alternative solutions. The selection of one or more likely actions and the evaluation of these actions against action analysis criteria.

6. Providing an opportunity sphere each receiver can autonomously choose an issue, investigate that issue, evaluate alternative solutions, and then carry out the chosen action(s) in either a real or surrogate setting. If time permits, a report to the group by each receiver with a subsequent evaluation of the total process.

| | |
|---|---|
| X | X |
| X | X |
| X | X |

METHODS COMPONENT X. RESOURCE UTILIZATION

*Focus: E.E. Compentencies Number 7*

| Content | Course Level | |
| --- | --- | --- |
| | Elem | sec |
| 1. Rationales for using field experiences With receivers, e.g., ecological knowledge, issue investigation and evaluation, etc. | X | X |
| 2. Local and regional resources available for use in E.E. | X | X |
| 3. Human resources available for use in E.E. | X | X |
| 4. Types of resource inventories available for use in E.E., i.e., generic vs specific models. | X | X |
| 5. Inventorying procedures for a resource survey in E.E., i.e., how to conduct a resource inventory. | X | X |
| 6. Procedures to use in the distribution of resource manuals and inservice teacher education in their use. | X | X |
| 7. Guidelines for teachers in the methods of resource utilization. | X | X |
| 8. Instructional strategies for resource utilization, i.e., alternatives available for effective instructional outcomes. | X | X |

Sample Instructional Recommendations

| | Elem | sec |
| --- | --- | --- |
| 1. Provide for practice in the inventory process subsequent to instruction on rationales, processes involved, etc. | X | X |
| 2. Provide rules to be followed in conducting safe and environmentally sound field trips. | X | X |

---

1 An extensive document on resource utilisation in E.E. which is recommended to the reader is: Wilke, R.J., An Analysis of Three Strategies Designed to Influence Teacher Use of, Knowledge of, and Attitudes Toward Resource Use in E.E. Doctoral dissertation, Southern Illinios University at Carbondale (USA . 1979.

2

| | |
|---|---|
| X | X |

4. Curriculum evaluation including at least the follo-
wing variables:

A) evaluation of student outcomes with respect to both
goals and objectives.
B) evaluation of the effectiveness of instruction for
meeting the goals and Objectives
C) evaluation of student and faculty enthusiasm for
programme
D) evaluating the effectiveness of inservice education
E) evaluating the effectiveness of progranme coordina-
tion

### Sample Instructional Recommendations

| | |
|---|---|
| X | X |
| X | X |

1. An inspection of a variety of environmental pro-
grammes by receivers. Said inspection should include at
least one thorough analysis of a particular programme
using criteria appropriate for the receiver's future
classroom (i.e., characteristics of classrooms in the
region and/or nation).

2. Lecture and subsequent discussion concerning both
implementation and evaluation strategies. Any available
programme implementation and evaluation case studies
should be considered for review and/or discussion
Empirical strategies used in both formative and summa-
tive evaluations should be explored as thoroughly as
time permits.

Implementation of Preservice EE Programmes
- Strategies for Bridging the Gap -

Describing a model teacher training programme in environmental education is one thing. Implementing a model programme in one's own institution is quite another thing. As Schoenfeld has stated- «as custodians of our culture, universities understandably are loath to change their configurations with any dispatch».[1] Put another way, changing the curriculum of a university can be like trying to move 3 cemetery. Yet, in order to incorporate the environmental dimension in teacher training programmes there must often be changes not only in curriculum, but, in infrastructures, budgets, and in personnel. In a superordinate tertiary educational system where change can be dictated and the system is sympathetic to change the problems associated with the incorporation of the environmental dimension may not be severe.[2] In certain other educational systems the problems may seem insurmountable.

It is evident from the second chapter on «Teacher Training Programmes in Environmental Education» that there are very few, if any, institutions where all components of the teacher education curriculum are used to develop the necessary environmental education competencies. Thus, if the goal of incorporating the environmental dimension in the programrne, contents, and teaching methods of teacher education is to be achieved there is an obvious need for change. Because of the varying circumstances from institution to institution and from nation to nation, recommendations regarding specific changes can not be made. Instead, the writers have identified variables which may impact upon the implementation of a preservice EE programme. To effectively implement a preservice programme these

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1. Schoenfeld, C. «Environmental Studies Programmes in Colleges and Universities Today» in Current Issues in EE IV. Davis, C., Sacks, A. (eds.) Columbus, Ohio. ERIC/StlEAC, 1978. p. 146.
2. Refer to Figure 1, the EE Infusion Process Flow Chart on Page 55.

variables must be dealt with successfully. This section of the document
will describe: (1) these variables, (2) how they affect the infusion of
WE in the curriculum, and (3) a process for implementing a preservice
programme. Finally, the reader will be asked to develope his/her own plan
for implementing a preservice teacher training programme in EE.

Variables Affecting Implementation of Preservice EE Programmes

An annotated list of selected variables which may affect the imple-
mentation of EE teacher training programmes follows.

1.  <u>Person(s) to coordinate and plan for infusion</u> (primary change
    agents) If implementation of a preservice EE programme is to
    occur, some person or group of persons must act as the primary
    change agents. These persons swill act as coordinators - identi-
    fying and using the many variables which can act as driving
    forces for infusion. At the same time, the change agents must
    find ways to overcome those variables which could impede infu-
    sion. In institutions where there are many influential and
    powerful persons acting as change agents, infusion can be more
    easily accomplished. In situations inhere only persons having
    little influence or power assume the role of change agents infu-
    sion will be difficult to achieve.

2.  <u>Inside Advocates</u> 1 In a study of the adoption of programmes for
    gifted children, House emphasized that the presence of an inside
    advocate was important to the adoption of innovations. He found
    that members of a system rarely come together to agree on goals,
    define Problems, and seek solutions. Rather, a person within the
    system usually sees it in his-or hen best interest for the sys-
    tem to adopt an innovation and then moves the idea through the
    appropriate channels.

    In many institutions, potential inside advocates for the infu-
    sion of EE can be identified. If these advocates exist, they can
    be helpful in building a strong base of support within the admi-
    nistration and faculty for EE. For example, faculty who have
    successfully infused EE into their own teaching may be very
    effective in generating positive attitudes towards EE amongst
    their peers.

3.  <u>Faculty attitudes toward infusion of EE</u> Faculty can facilitate
    infusion by enlisting the support of administrators and by exhi-
    biting their enthusiasm to other faculty. In some

1. House, ER; Steele, J.; Kerins, T. <u>Development of Educational
Programmes: Advocacy in a Non-Rational System.</u> Urbana, Illinois, Center
for Instructional Research and Curriculum Evaluation, University-of
Illinois, 1970.

Cases faculty are the locus of infusion decisions; in others, infusion may be dictated to them. In cases where the decision to infuse EE is made above them in the hierarchy and passed dozen to them, faculty may abort the decision by passive resistance. Usually, faculty who are involved in planning for infusion will provide greater support for it. In all cases, positive faculty attitudes toward infusion will help guarantee success.

4. <u>Faculty possession of EE competencies</u>

The degree to which the faculty of the preserve teacher training programme themselves possess the necessary EE competencies is a critical variable. Obviously, if one does not possess the necessary knowledge, skills, and attitudes one can not develope same in preservice teachers.

5. <u>Administrative interest and support</u>
Administrators, through their functional roles as legitimizers or gatekeepers, are important to the success of infusion. Their informal disapproval can act as a major barrier to a change agent's efforts. Often times official administrative approval is required for curriculum changes. Usually, administrators are the key to the necessary internal reallocation of funds for items such as: supplies, textbooks. consultants, inservice time, etc.

6. <u>Peer trainers</u>
Often the use of peers for training faculty can help to generate a positive affect toward efforts to incorporate EE in the curriculum. Some institutions will have faculty members available who already possess EE competencies. If such a situation exists, the use of these peers as inservice trainers can act as a driving force toward the infusion of EE.

7. <u>Consultants and EE specialists</u>
If preservice faculty require training to assist them in incorporating the environmental dimension, EE specialists and/or consultants may be necessary to assist with this training. In fact, EE specialists comprise a critical component of each of the inservice training models presented in the section of this document on «Inservice Teacher Training». Thus, institutions with ready access to EE specialists and/or consultants will be at an advantage compared to institutions not possessing, or having access to these experts.

8. <u>Students</u>
Students can influence the success of EE infusion in their preservice training programme. Feedba k from students will usually influence a faculty members perception of the innovation. Students also report their reactions to other students, who may, depending upon the reports, flock to the courses in question, or,carefully avoid them. Thus, student support and feedback can be an important variable influencing the infusion of EE.

9. Faculty tenure and promotions
   In an institution where the administration supports the infusion
   of EE, the abilities and Willingness of individual faculty mem-
   bers to incorporate the environmental dimension in their tea-
   ching can be considered when decisions are made regarding
   hiring, retention, assignment to courses, and promotion.
   Conversely, where no administrative support exists, faculty may
   be forced to devote their time and energy to areas of concern
   other than EE.

10. Faculty inservice mechanism
    In some institutions mechanisms for faculty inservice already
    exist. where time is already allocated for faculty inservice, or
    Where team support strategies or peer training are used, or
    where a teacher centre exists, faculty inservice will usually be
    more readily accomplished.

11. Internal fundin
    Institutional reallocation of funds will often be necessary to
    provide essential consultants, inservice time, supplies, text-
    books, etc. An adequate base budget plus administrative support
    is necessary to achieve the required reallocation. Lack of
    either could negatively impact upon the infusion of EE.

12. External funding
    Financial support for the infusion of EE can sometimes be obtai-
    ned from outside of the teacher education institution. Some ins-
    titutions may have access to these external funding sources. For
    example, within the U.S.A. there are a variety of sources of
    external funds which could aid infusion. Examples include
    National Science Foundation programmes such as «Local Course
    Improvement, «and» Comprehensive Assistance to Undergraduate
    Science Education»; Office of Education programmes such as the
    «Fund for the Improvement of Post Secondary Education»; and,
    private foundation sources such as the EXXON Education
    Foundation.

13. Existing institutional curriculum
    In some cases,1 almost all the necessary courses exist and can
    be added to a preservice programme to alleviate any EE competen-
    cy deficiencies. In other situations, there may not be appro-
    priate courses available to alleviate deficiencies. In some ins-
    tances, courses within the preservice programme may already
    develope mos. EE competencies; while, in other cases, little may
    be accomplished in existing courses regarding EE competency
    development.

14. Textbooks
    The time of textbook change or selection can be important to
    those advocating the infusion of EE. Certain textbooks are more
    environmentalized than others, and thus will better aid in the
    development

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1. As in the example from Michigan State University provided in an
earlier section of this document entitled A Process for Curriculum
Development in Teacher Training Programmes.

of EE competencies. Also, publishers representatives can often
be used to provide evaluation data, cost/benefit data, consul-
tant assistance, etc.

15. Resource utilization
    The availability of resources and faculty use of same can
    influence the infusion of EE. Where resource use is maximized
    instruction can be enhanced and infusion facilitated.

16. Facilities
    The availability of certain inschool and out-of-school facili-
    ties can be critical to the implementation of a preservice EE
    programme. Consideration must be given early to facility needs
    as they relate to the curriculum. If facilities are not adequa-
    te, either the facilities or curriculum must be revised to insu-
    re successful implementation.

17. Supplies and Equipment
    The question of whether an institution has appropriate supplies
    and equipment to implement a preservice EE programme is very
    important. What happens in a programme requiring the duplication
    of large numbers of worksheets When duplicating supplies are
    lacking? I-that about laboratory or field equipment? Is it avai-
    lable or can it be obtained?

18. Accreditation agencies
    Recommendations from accreditation agencies usually carry immense
    weight with administrators and faculty. In cases where accredi-
    tation agencies support or encourage EE training for teachers,
    both the administration and faculty will probably work toward
    the implementation of an EE preservice programme. On the other
    hand, accreditation agencies may hinder the implementation of an
    EE programme by requiring so many specific courses that little
    or no electives remain for those interested in enrolling in an
    EE methods course or some other appropriate course, e.g., ecolo-
    gy.

19. Regional/state/national education agencies
    Education agencies can influence the implementation of an EE
    preservice programme in many ways. Personnel from education
    agencies often serve as consultants and assist with inservice
    training. In some states and/ or nations education agencies are
    responsible for textbook adoption policies. Education agencies
    may even have funds available to assist with implementation. The
    Office of Environmental Education in the U.S. Office of
    Education has provided funds for hundreds of WE curriculum deve-
    lopment efforts. Finally, in some places such as Wisconsin (USA)
    the education agency may require all preservice teachers to com-
    plete coursework in EE or a related area.

20. Labor/business/professional organizations
    The leadership in professional organisations has the
    potential to facilitate infusion. Like all opinion leaders,
    the leaders in professional organisations have opportunities
    to influence their social system to innovate or to
    maintain the status quo. They can use their Authority to
    support new teacher training programmes; they can reward

innovative efforts and offer services that will foster infusion;
they can influence faculty and administrators through their jour-
nals and through activities undertaken by their organisations.

Utilizing Appropriate Occasions


The natural life of a teacher training institution and of those who

Work in it provides numerous occasions when discussion takes place and

decisions are made. Many of the variables identified in this section can

be thought of as occasions at which time there is a potential to influen-

ce the implementation of a preservice EE programme. Below is a list of

occasions that may be utilized to bring about the changes necessary for

successful implementation.

Faculty meetings

Book and materials selection

Budget making

Professional conferences or conven-
  tions

Social occasions: picnics, dinner
  parties, luncheons

Lunch (in school)

Coffee breaks

Personnel selection or assignment

Promotions

Course changes

Curriculum revisions

Library acquisitions: books, pam-
  phlets, newspapers, professional
  journals

Grading or testing

Teacher inservice programmes
  Institute days
  Evaluations, assessments
  Accreditation
  Classroom visitation

Unplanned meetings in lounge or
  halls

Convocations or other university-
  wide events Negotiations

Equipment purchase or assignments

Visitors from other universities
 ment from the community

Administrative meetings
  Articles or announcements in pro-
    fessional journals

Publicity in local or regional
  papers

Changes in legislation or policies
State and national meetings

Assessing the Situation

The list of variables described in this section is certainly not exhaustive. However, the list is extremely important. Those developing strategies to implement EE teacher training programmes must take the variables described in this document end other relevant variables into consideration. Relevant variables may have little influence or they may be extremely influential. In fluential variables can act as either driving or restraining forces. It is usually wise to inventory both those forces which can hinder implementation and those which can facilitate implementation.

Take inventory of your situation. If a variable listed below will be in fluential in your situation indicate whether the variable is likely to be a restraining force or a driving force.

| Restraining Force | Variable | Driving Force |
|---|---|---|
| _____ | Primary Change Agent(s) | _____ |
| _____ | Inside Advocates | _____ |
| _____ | Faculty Attitudes | _____ |
| _____ | Faculty EE Competencies | _____ |
| _____ | Administrative Support | _____ |
| _____ | Peer Trainers | _____ |
| _____ | Consultants & EE | _____ |
| _____ | Specialists | _____ |
| _____ | Students | _____ |
| _____ | Faculty Tenure & | _____ |
| _____ | Promotion | _____ |
| _____ | Existing Inservice | _____ |
| _____ | Mechanism | _____ |
| _____ | Internal Funding | _____ |
| _____ | External Funding | _____ |
| _____ | Existing Curriculum | _____ |

| Restraining Force | Variable | Driving Force |
|---|---|---|
| _____ | Textbook Adoptions | _____ |
| _____ | Resource Utilization | _____ |
| _____ | Facilities | _____ |
| _____ | Supplies & Equipment | _____ |
| ___ __ | Accreditation | ___ __ |
| _____ | Regional/State/National | _____ |
| _____ | Agencies | _____ |
| _____ | Labor/Business/Professi | _____ |
| _____ | onal | _____ |
| _____ | Organizations | _____ |
| _____ |  | _____ |
| _____ | Other | _____ |
|  | Other |  |

Once an assessment has been made of the situation, strategies should be employed to overcome restraining forces which could impede implementation of the programme. One strategy (described earlier in this document) which is suggested is the Force Field Analysis.

Implementing a Preservice Programme

After the situation for a preservice programme has been assessed and act-ions have been initiated to reduce or eliminate restraining forces, pro-gramme implementation may begin. Figure 4 illustrates the major steps which are recommended in implementing a preservice EE programme. This illustration should be self explanatory.

Developing the Implementation Plan

The reader should now be familiar with the variables influencing the imple-mentation of an EE preservice teacher training programme. Further, the

_____

1. The Force Field Analysis is described in Figure 2 on page 58.

Implementing a Preservice EE Programme[1]

Change Agent(s)

| Inside and Outside Advocates develope administrative support and interest | Assess the Need for EE in the Programme... ...analyze existing curriculum ...identify EE competencies being achieved ...identify EE competency deficiencies | Inside and Outside Advocates utilize appropriate occasions to develope support[2] |

Administrators support implementation and utilize appropriate occasions to exhibit support[2]

Plan for competency deficiencies by identifying existing courses for infusion of EE and/or identifying additional courses to be added to or developed for the programme, e.g., EE methods

Encourage development of necessary courses

Identify faculty teaching the above courses and/or faculty willing to develop the necessary courses

Promote positive attitudes toward EE

Assess faculty to determine their...... ...levels of EE competencies ...attitudes toward EE ...attitudes toward inservice programmes ...preference for inservice programme model

Provide funding, time, and personnel for inservice

Provide inservice programme as described in Figure 6 on page 116 of this document

Faculty possessing EE competencies and positive attitudes toward EE work with change agents to implement EE teacher training programmes

Provide external funds and internal support (e.g., peer trainers) for inservice and infusion

Provide necessary financial support, also, retain and recruit faculty possessing EE competencies

Infusion of EE in the preservice programme

Assess EE competencies of graduating teachers

Revise programme as necessary

-- iii --

1. The reader may wish to refer to the section in this document entitled "A Process for Curriculum Development in Teacher Training Programmes."

2. The reader may wish to refer to page 108 which lists occasions that might be utilized in a change strategy.

Figure 4. Implementing a preservice EE Programme

reader should have ideas regarding how any variables acting as restraining forces may be overcome. Finally, the reader should now be aware of recommended processes for developing and implementing teacher training programmes Which incorporate the environmental dimension. It is now time for the reader to develope plans for incorporating the environmental dimension in his/her own teacher education institution(s). Hopefully, the reader will be an effective change agent.

The writers suggest that the reader think of himself (or herself) as a playwright. As a playwright the reader must decide what various actors (faculty, students, administrators, etc.) should say and do, and where. Certain actors may need to-be involved several scenes prior to the one in which they play a major role. The roles of stars and those of minor players must all be given attention. Because each actor is significant to the eventual outcome, the reader must plan for everyone carefully. Like a playwright, a change agent must anticipate the sequence of events, yet realize that actors play their roles as they personally interpret them. Acting as a change agent or playwright the reader must consider how much deviation is acceptable without changing the essence of the implementation plan. It is important to remember that as in a play, success depends largely upon appropriate and effective cornbinations of the talents of many people.

As the reader developes the implementation plan for his/her particular situation it will be wise to keep in mind the following generalisations.

> *	Legitimization of the implementation plan by appropriate authorities in the institution is necessary before complete implementation can take place

> * R	eady acceptance of the implementation plan is facilitated by a demonstration of comparative advantage. * A clear perception of the incentives and advantages associated with the incorporation of EE in the programme is necessary.

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1. The generalisations listed here have been adopted from the National Seminar on the Diffusion of New Instructional Materials and Practices held at Wingspread in Racine, Wisconsin (USA) during June 1973.

*       Whenever possible, accomodation should be made to existing conditions without limiting the incorporation of the environmental dimension.
*       Those affected by the implementation plan should be involved in the formulation and modification of appropriate components of the plan.
*       The commitment of the teacher education institution itself is crucial to the ultimate success of the implementation plan.

Inservice Teacher Training

Care in the design and implementation of inservice environmental education (E.E.) training is critical if the programme is to result in effective E.E. in the classroom. It is the purpose of this section to discuss the following components of the planning and implementation stages.

1. Models for Inservice Training

2. Guidelines for Selecting Inservice Models

3. Guidelines for Designing Inservice Programmes

4. Planning an Inservice Training Programme

5. An Eclectic Model for Inservice Training

Models For Inservice Training

Inservice training programmes may utilizc one of three organisational designs, or some modification or combination of these three basic designs.

---

lThis section draws heavily on a review of the literature and evaluation of inservice teacher training models reported in the following documents. If the reader requires a more indepth look at this topic, these reports are highly recommended.

Teacher Training Schemes in Population Education. Abstract - Bibliography Series 1, Part 1, prepared by Population Information Division and Population Centre Foundation, Inc., South Super Highway, Rizal, Philippines. April, 1976. (ERIC, ED. 171 604 S0 011 618)

Effective Evaluation of Teacher Training In population Education. Abstract - Bibliography Series 1, Part 2, prepared by Population Information Division and Population Centre Foundation, Inc., South Super Highway, Rizal, Philippines. April, 1976. (ERIC, ED. 171 605 S0 011 619)

Tamayo, Ann L., Teacher Training Schemes in Population Education, Research Utilization Monograph Series 2, Part 1. Population Education Research Utilization Project, Population Information Division, Population Centre Foundation, Makati, Rizal, Philippines. 1977. (ERIC, ED. 171 602 S0 011 616)

Each has been shown to be an effective model for inservice training, but differences in attributes and constraints make each suitable for different situations. The three basic categories are superordinate training, peer training, and modular training. In addition, a fourth - eclectic - model may be used which combines the best attributes of these three basic approaches.

The superordinate model used the hierarchical structure of the educational system to facilitate inservice programmes. One application of the model provides for the training of administrators (superintendents, principals, supervisors) by a team of specialists. These administrators then train larger groups of teachers, and additional trainers. Figure 5 presents a flow chart illustrating one way this system may be applied.
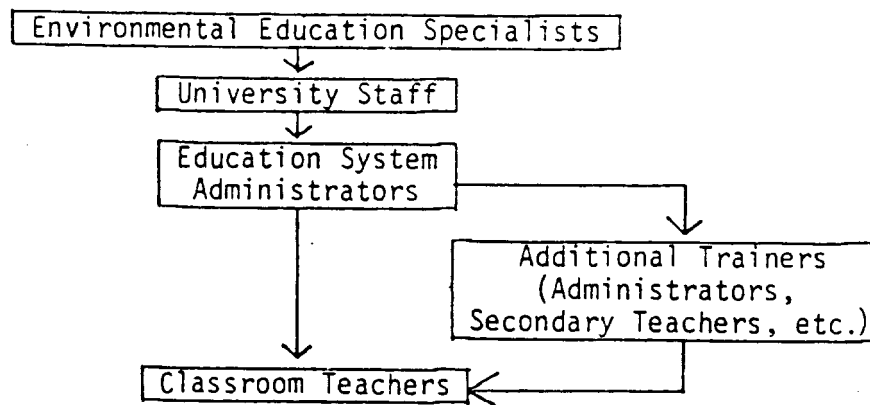


Figure 5. A superordinate training model.

The peer training model utilizes members of the faculty as trainers. These trainers are given some intensive training experience in E.E. and in how to train their colleagues. They are then asked to conduct peer training sessions. These newly trained individuals may also train additional peers, creating a desired «multiplier».effect.

```
┌─────────────────────────────────────┐
│ Environmental Education Specialists  │
└─────────────────────────────────────┘
                    ↓
        ┌──────────────────────┐
        │ Core Teacher Trainers │←────────┐
        └──────────────────────┘          │
                    ↓                      │
        ┌──────────────────────────┐      │
        │ Peer Training ── Centre   │──────┘
        └──────────────────────────┘
```
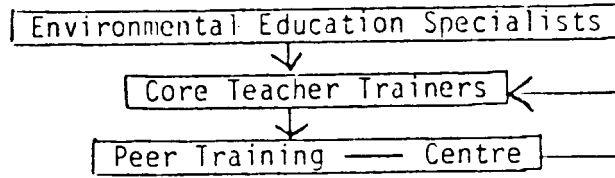
Figure 6. A peer training model.

The modular training model is actually an individualized and/or self-paced approach. This technique provides sets of self-instructional materials on specific topics in E.E. Each module contains objectives, pre-test, learning activities and post-test. A module may be in written, video-tape, slide and tape or other formats. The learning activity may involve participants in either individual or group tasks such as reading, group discussion, laboratory investigation, values clarification or writing assignments.

While each module is generally prepared to function as an independent unit of work, the total programmers generally organized around some hierarchical structure or theme. Teachers are then guided individually - or as loosely organized groups - through a particular sequence of learning activities (modules). Each participant satisfactorily completes the objectives of a module before progressing to the next. Figure 7 illustrates the modular approach to inservice training.

```
        ┌───────────────────────────────────────────────┐
        │     Environmental Education Specialists         │
        └───────────────────────────────────────────────┘
          ↙                    │
┌──────────┐  ┌──────────────────┐    ┌──────────────────────┐
│ Prepare  │  │ Act as Consultants│ ↓  │ Train Consultants from│
│ Training │  │  to Facilitate   │ or │    within System to   │
│ Modules  │  │    Learning      │    │  Facilitate Learning  │
└──────────┘  └──────────────────┘    └──────────────────────┘
              ↘         ↓          ↙
              ┌────────────────────┐
              │ Classroom Teachers  │
              └────────────────────┘
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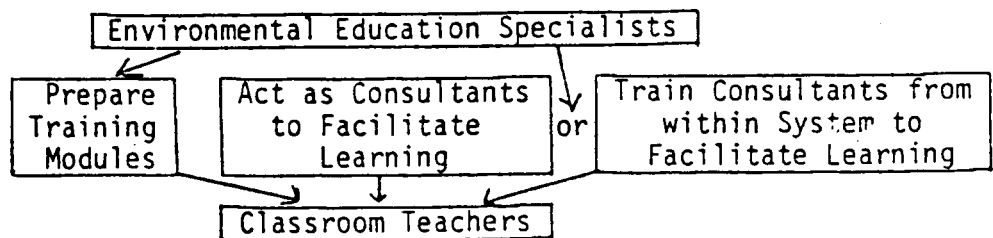
Figure 7. A modular training model.

All three models have been used successfully. However, each has

some attributes and/or constraints which make it more or less suitable for some situations. Following are some comparisons which should be considered in selecting an inservice model.

Effectiveness in Changing Knowledge, Skills, and Attitudes - While research evaluating these models is minimal, there is some indication that all three approaches bring about desired changes in knowledge and skills, but may differ in bringing about attitudinal and behavioral changes in the classroom. In some of the superordinate models reviewed, participants failed to develop the desired attitudes even though they showed gains in the cognitive domain. Participants of one such programme even showed negative attitudes toward the training programme itself and questioned the value of the training.

It must be remembered that this outcome may be the result of poor implementation rather than the fault of the model itself. However, it is still an indication of the need for the involvement of participants in the planning and implementation of an inservice programme. Some inservice populations may prefer the authoritarian approach of the superordinate model, given that it is competently presented. Evaluations of some peer training programmes revealed that a major problem is caused by a lack of credibility of peer trainers. The inservice teachers were not convinced that their peers were competent trainers. Paradoxically, one of the strongest attributes of this type of inservice training for some populations, is the positive affect and rapport generated by working with peers.

The modular programme will not be effective if the inservice participants are not willing or capable of working independently. They must be motivated to accept the role of a «self-starter.» For some populations,

the role of a subordinate in a superordinate training system may be more comfortable.

Difficulty of Management and Coordination of Training - Modular training programmes are easier to manage and require less coordination for implementation due to the smaller staff requirements and less interaction among levels in the educational system. (However, this does not include considerations of the development of a coordinated modular programme for implementation. The preparation of these materials may be quite a task in itself. Of course, all three models will necessitate some degree of material preparation.) Superordinate training requires the most management and coordination due to the large staff required and the involvement of several levels in the hierarchy.

Need for Training Staff - Both superordinate and peer training programmes have a critical need for large numbers of well trained staff at several levels. The modular programme requires training expertise mainly among those who initially develope the self-instructional programme.

Time requirements for staff training also vary according to trained staff needs. The superordinate model requires a large amount of time, since the training of each level must occur consecutively. Peer training requires less time, and, of course, the modular programme necessitates the least training time.

Programme Cost - Training costs are largely a function of staff size. Therefore, superordinate approaches may be expected to incur the highest costs and modular programmes to cost less than the other two. This is assuming that the production of materials for the latter approach does not become excessive.

Guidelines for Selecting Inservice Models

Selection of appropriate models or model components should involve a number of considerations such as those presented here.

Objectives of the Training Programme - If the inservice training is expected to provide all necessary E.E. competencies, the approach may be different from that taken to keep previously trained teachers up-dated on specific topics or on methods in E.E. The latter purpose may be achieved by mini-workshops offered by outside experts or by trained peers. This may also be an appropriate way to use inservice modules which teachers work through on their own and in small group workshops.

The more challenging task of thoroughly training an inservice population of teachers may require a more eclectic approach. Components of all three models may be appropriate in a comprehensive training programme.

If the programme is intended to build a positive attitude towards and acceptance of the infusion of E.E. into the classroom, a model should be developed which relies at least partially on peer training. Peers who have successfully infused E.E. into their own teaching, or who are positive about a proposed E.E. curriculum adoption may be more effective in facilitating participants' attitude development than superordinates or outside experts. Conversely, participants may more readily accept authorities as sources of cognitive information and skills.

Characteristics of the Inservice Population - The preservice training received by elementary educators generally does not provide indepth backgrounds in science or technical-disciplines. It may not be efficient to train elementary classroom teachers to become resource experts for their

peers in these cognitive areas. While they may act as trainers for their peers to accomplish some parts of the programme (e.g., use of E.E. curricula, E.E. methods), it may be more effective to also bring in outside resources, or train secondary teachers within the system to cover technical information. Obviously, the peer training approach may be very efficient to teach technical information to secondary educators.

Available Facilities - Obviously, selection of inservice formats will be heavily influenced by limits imposed by available time, finances, consultant help, and/or staff trainers. A review of the components of the three basic models should be made, in view of the constraints noted above. For example, if time is limited for training staff, a complex superordinate model would be inappropriate. The inservice programme would be more likely to include peer training and modular components.

Guidelines for Designing Inservice Programmes

None of the proposed models inherently guarantee total success in training inservice teachers Yet, each has the potential of effectively preparing classroom teachers in E.E. given that the necessary conditions exist. If this potential is to be reached, planners must develope strategies for:

(1) assessing the needs and preferences of the inservice teachers and involving them in all dimensions of the planning process.

(2) securing the support of the administration (at all levels of the educational system) for the goals of the inservice programme.

(3) selecting competent trainers at any level who have adequate knowledge, skills, and the ability to establish rapport with trainees.

(4) providing adequate time for the effective completion of training.

(5) assuring that necessary materials will be available at appropriate times and-in sufficient quantities.

(6) coordinating programme efforts between and within levels of the system.

(7) evaluating the process of the programme and revising plans accordingly.

Planning an Inservice Training Programme

Figure 8 illustrates the major steps which are recommended in planning for an effective inservice training programme. Each of the steps are further described in the discussion which follows.

Establishing the Steering Committee - This committee is responsible for the planning stages. Obviously, it plays a critical role in determining the ultimate outcome of the project. Committee members should include representative from:

1. the administration of the educational system.

2. interested teachers from elementary and secondary levels.

3. the community (parents, businessmen, and/or government).

The size of the committee may vary but it should not be so large that efforts of its members become counterproductive. Nor should it be too small, or lack representation in any of the critical areas listed above.

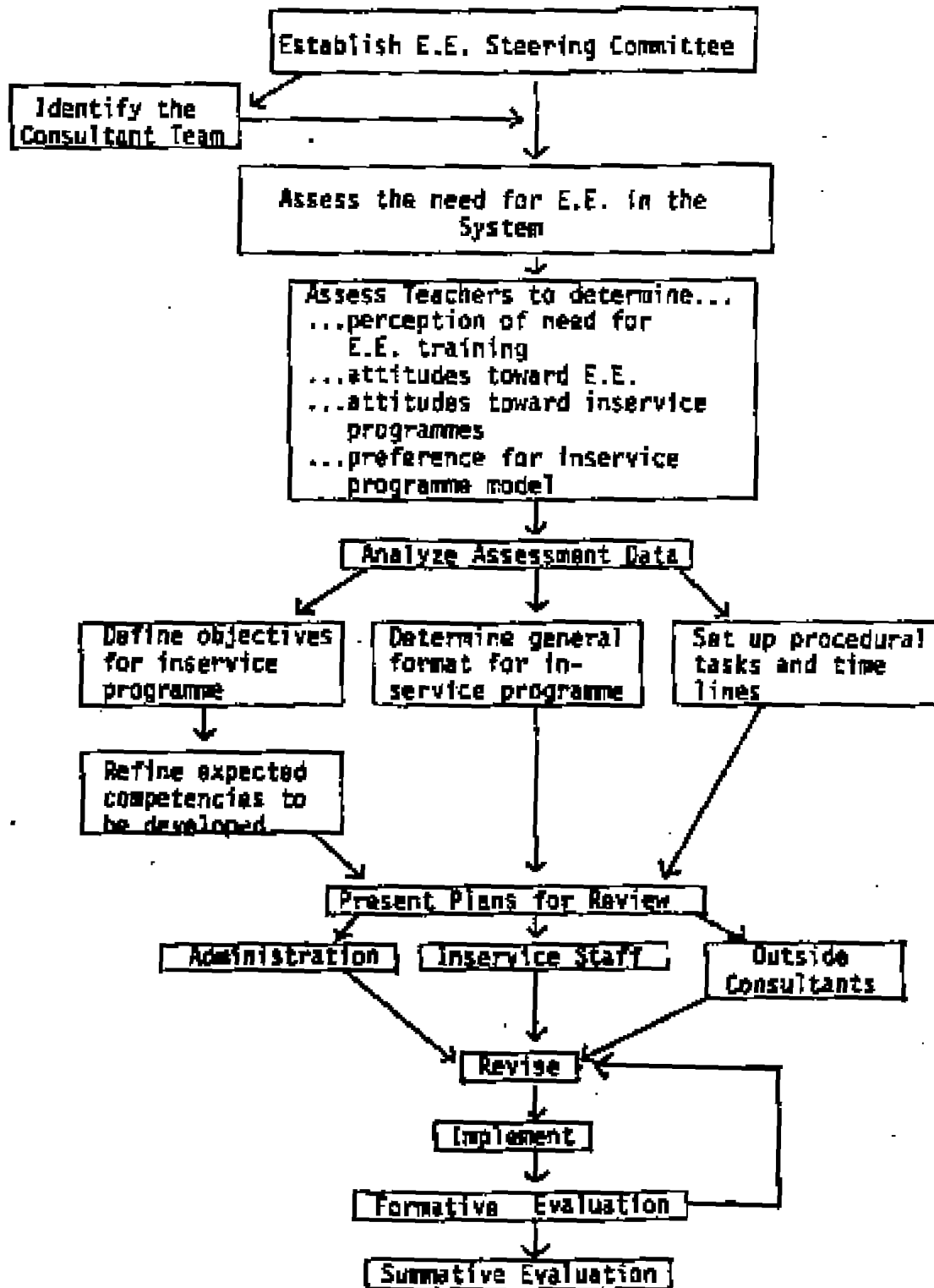PLANNING AN INSERVICE E.E. TRAINING PROGRAMME



Figure 8.

Consultant Team - The consultant team should include individuals with competencies in the following areas:

1. E.E. curriculum development.

2. E.E. teacher training.

3. programme (curriculum) implementation and evaluation.

In addition to this core team of consultants, resource persons should be available who have expertise in the following areas:

1. ecology and environmental science.

2. areas of important environmental issues.

3. environmental problem solving.

These resource persons may serve as consultants during the development of instructional materials as well as during inservice training sessions.

The consultant team will assist the steering committee in all major planning stages where necessary. In addition, they may be needed to identify, select, and/or develope inservice training materials (e.g., modules) prior to the training sessions. The enlistment of this team's cooperation should be made early to insure that deadlines can be met.

Environmental Education Needs Assessment - The steering committee (and consultants) should determine the degree to which E.E. goals are presently being met in the educational system. This will help identify existing successful E.E. efforts which may be maximized in the planning process. In addition, this assessment will indicate the degree of training necessary. The assessment should be made by analyzing real and perceived teacher competencies and/or needs, analyzing curricular materials for existing E.E. components, and measuring student outcomes in E.E.

Teacher Preference Assessment - Any inservice programme which strives to change teacher knowledge, skills, and behaviors must consider the teachers' own preferences if it is to be effective. Requesting teachers' input at this point swill not only provide useful data for planning, but will be an initial step in keeping teachers informed of the plan and making them feel they are a part of the programme ratner than victims. The importance of building a strong, positive rapport with the inservice population cannot be over emphasized. Planning the programme to meet at least some of their preferences, where feasible, is a productive move in this regard.

The teachers' preferences concerning the format for inservice training (e.g., college credit, peer training, weekend workshops, summer workshops, etc.) should be determined. In addition, the committee should get an indication of their feelings toward E.E., the need for E.E. inservice training, and about inservice programmes in general.

Data Analysis and Programme Planning - The information gathered should be used to:

1. define programme objectives.

2. specify expected competency outcomes.

3. plan a general format for the programme.

4. establish procedural tasks and time-lines. This planning should reflect the guidelines discussed throughout this document as well as the findings of earlier assessments.

Staff Review of Plans - Once the plans have been developed, the proposed inservice programme should be submitted to staff at all levels for review. In addition, it may be helpful to contact other consultants outside the system for critical review of the proposal.

Revision of the Proposal - The proposed inservice programme may be changed in accordance with staff and consultant reactions.

Implementation and Evaluation - Once the project is implemented, it should be submitted to an ongoing formative evaluation and revised accordingly. Further, the completed project should be evaluated for effectiveness to facilitate future planning efforts for inservice programmes.

An Eclectic Model for Inservice
Training (K-12)

It is impossible to anticipate the specific needs of any educational system in developing an inservice training model for a document of this type. However, it is important to present a model which serves to operationalize the guidelines and criteria discussed in the previous section.

The model described on the next few pages is one suited for a K-12 educational system with a total commitment to E.E. and an adequate supply of funds for inservice training. Granted, this is an ideal situation which may not often exist. However, the model should exemplify the critical needs for planning and staff involvement, as well as other guidelines described earlier. It is assumed that teachers will be given salary and/or college credit as incentives for their participating The model is intended to take two years to complete and entails five phases.

The purposes of the inservice programme described here are tc . .

. . . develope a positive attitude in the inservice population about the need for E.E. -in general, and their own use of E.E. curricula in particular; and,

. . . initiate the development of E.E. competencies at a level sufficient to facilitate the immediate classroom implementation of E.E. and the continued development of teachers' E.E. competencies.

<u>Phase 1: Planning</u> (Fall through spring of the first academic year)

During this phase, an E.E. steering committee will be established which will initiate the steps outlined and discussed in the previous section. For purposes of this example, it is assumed than the planning has resulted in the following model. An additional task of the Steering Committee then becomes the coordination of a selection process to establish the Inservice Core Team (ICT). The size of the team depends on the available funds and size of the inservice population to eventually be trained. This team should be comprised of the following groups, and may include some of the individuals from the steering committee.

1. administrators (from all levels).

2. peer trainers (both elementary and secondary levels).

3. E.E. facilitators (both elementary and secondary levels).

4. regional E.E. coordinator.

The E.E. facilitators (at least one at both elementary and secondary levels) and regional coordinator will work during the implementation phases and beyond, to facilitate the continuing improvement of E.E. in the classrooms. Their responsibilities will include peer training, model teaching, consultation (e.g., «trouble shooting» curriculum difficulties), curriculum revision, inservice workshops to update E.E. competencies of teachers and programme evaluation. Their selection should be based on their abilities to work with peers and on their competencies in E.E. The regional coordinator will serve more in an administrative capacity.

Peer trainers should be representative of all grade levels and subject areas. Sufficient numbers should be selected to facilitate later

training of the entire inservice population. These peer trainers will also serve as pilot teachers of E.E. materials and provide role models for their colleagues.

Administrators must be included if they are to be sensitive to the importance of the E.E. programme and its needs for effective implementation. Administrative support is critical to the success of the total programme .

Selection of this team should be coordinated by the steering committee, but input should be provided by the inservice population. Also during this time, consultants should begin preparing and/or selecting training modules and materials for the upcoming ICT training session. They should be given sufficient lead time to adequately prepare for the training sessions (4-6 months).

Phase 2: Training the Inservice Core Team (First Summer)

This team will be critical to the implementation of the inservice programme, and the continued improvement of the E.E. curriculum. Training for the entire team should occur at a major centre (e.g., university) so that resource persons and facilities (e.g., curricular materials) are readily available.

The content of this and subsequent training sessions will be dependent on the objectives and specific competencies identified by the planning process. In addition, the members of the ICT will be expected to develope skills in training their own colleagues. For exemplary purposes, a general topic outline is presented here.

Consultants should have prepared the self-instructional and other training materials so that the ICT could experience using them. The ICT

will be expected to facilitate use of these same materials by their colleagues.

A critical point here is that the ICT and all inservice teachers be trained using the E.E. curricula and methods that they will be expected to implement in their oven classrooms.

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Phase II: Inservice Training

Week 1

Environmental science (ecology; natural resource survey, etc.)

E.E. philosophy, goals, general methods (e.g., values clarification)

Week 2

Environmental science

Survey of environmental issues: local, regional, Worldwide; case study
    analysis

Week 3

Investigating, evaluating, and planning actions for environmental
    issues

E.E. curricula and methods*
    (*Beginning here, the ICT may break into groups according to sub-
    ject matter and grade level to consider E.E. methods, curricula and
    training modules.)

Week 4

E.E. curricula and methods; infusing E.E.

Methods of developing modules and training materials for inservice
    training.

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<u>Weeks 5, 6, 7 and 8</u>

Members of the ICT will spend the remainder of the workshop developing and/or adopting E.E. curricula for use in the classroom. They still also revise and/or develope self-instructional and other training modules to be used with the inservice teachers. Consultants and secretarial help will be made available along with adequate curricular materials.

Planning sessions will be held during this time to allow the ICT to finalize inservice training plans. Some additional sessions may be necessary to further develope ICT members' own E.E. competencies (e.g., more seminars on environmental problem solving).

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<u>Phase 3: Initial Inservice Training Sessions (Late Summer)</u>

Inservice teachers will attend a 5-day workshop taught by the ICT in the late summer or early fall. They will be reintroduced to the overall plan, and begin training with the ICT and self-instructional modules. Teachers will be assigned modules to complete during the year. One day workshops will be held each month throughout the academic year to facilitate their progress.

Part of this 5-day training session will introduce the inservice teachers to E.E. goals and methods. They will be trained to use a specific E.E. unit in their own classroom as a pilot experience.

<u>Phase 4: Piloting E.E. in the Classroom</u> (Second Academic Year)

Peer trainers in the ICT-will initiate teaching of selected and/or developed E.E. curricula in their own classrooms during this first year.

Other inservice teachers will also pilot E.E. to a limited extent. They will continue to receive inservice training during this phase in one-day workshops.

Phase 5: Intensive Inservice Training Workshop (Second Sumner)

This 10-day Workshop will complete the initial inservice training of teachers. Part of this session will be devoted to developing anci/ar adapting selected E.E. curricula to their own classrooms.

Phase 6: Final Implementation (Third Academic Year)

All teachers will be expected to implement (infuse) E.E. in their classroom teaching. Continued monitoring and consultation by members of the ICT will facilitate this process.

Phase 7: Program Evaluation and Updating (Ongoing)

It is essential that E.E. implementation be continuously evaluated and that opportunities be provided to update E.E. competencies of teachers. Update workshops might be held to familiarize teachers with environmental issue related information or new E.E. curricula. For example, seminars might be held to inform teachers of important environmental issues as they develope.
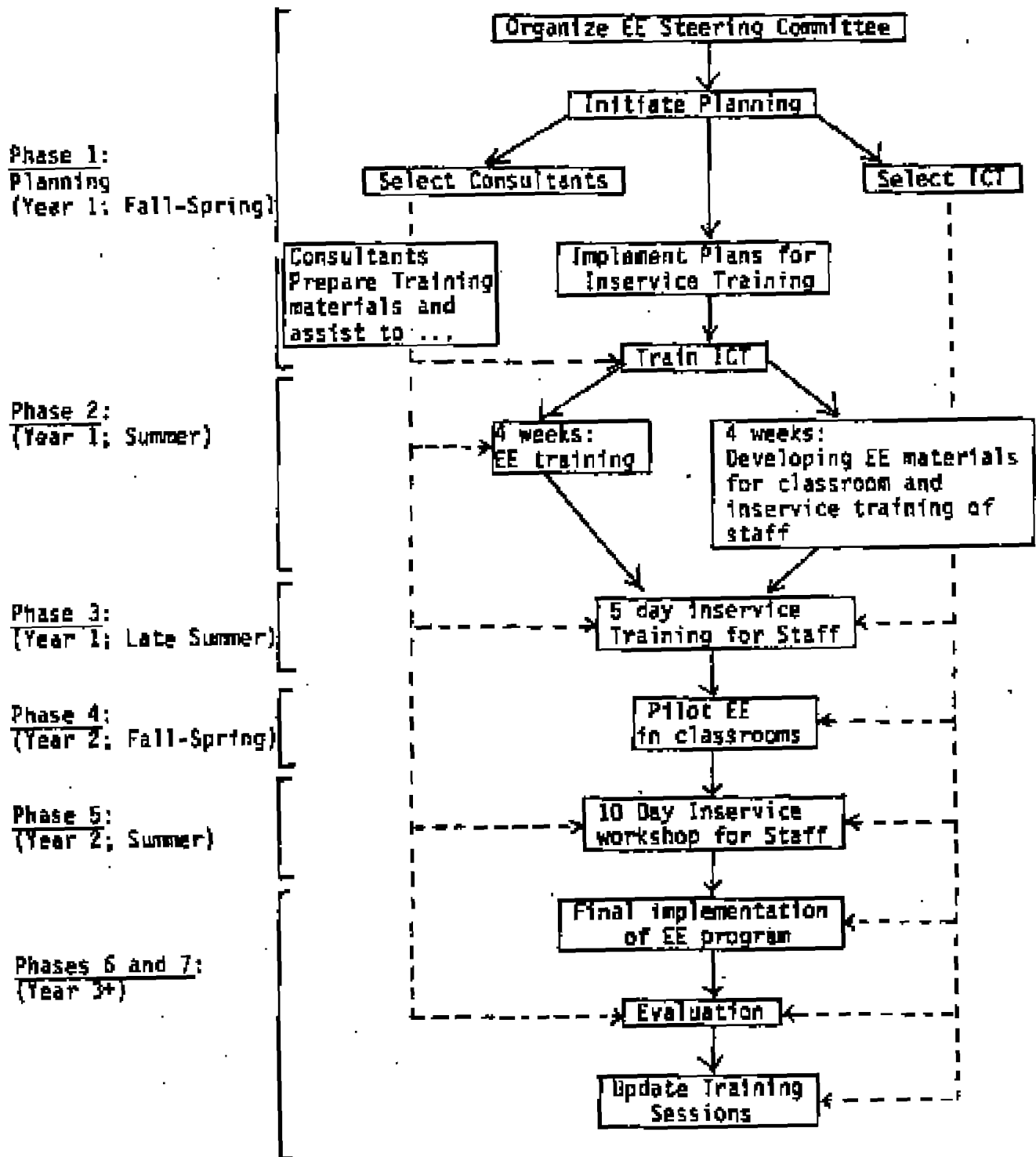

CHAPTER IV

SUMMARY/CONCLUSIONS

Certainly, the number of effective Environmental Education (E.E.) teacher training programwnes in the world is far below an acceptable level, yet numerous examples of such preservice and inservice programmes do exist. These programmes vary widely in breadth, in scope, and in methodologies, and offer a variety of models for those interested in establishing teacher training programmes in E.E.

Regardless of the ultimate format selected for a teacher training programme, care must be exercised to see that the final product (E.E. teacher) of the programme has sufficient competencies to be an effective environmental educator. The degree of competency required in various areas will depend on the grade level, subject matter, and target population to which the teacher is assigned. However, effective environmental educators should exhibit foundational competencies in:

1. professional education;
2. ecology;
3. conceptual environmental awareness;
4. environmental issue investigation and evaluation;
5. environmental action skills.

These foundational areas must be refined further if they are to guide in the development of a training programme. However, the comprehensive and hierarchical nature of these competency areas should serve to outline the scope involved in a programme to train effective environmental educators.

Including E.E. in a preservice teacher training programme may involve any one or combination of three approaches: (1) developing a specific

course in E.E. methods to add to the curriculum; (2) infusing E.E. methods and foundational components into existing programme courses and (3) addition of other courses in the curriculum which deal with foundational E.E. components. Each approach provides some distinct strengths and imposes some constraints, all of which must be considered in developing a programme.

An E.E. methods course is an <u>efficient</u> way to prepare E.E. teachers, but the constraints of time available in a single course make its <u>effectiveness</u> questionable. This can be largely overcome by coordinating this approach with either or both of the other two approaches described. Developers of an E.E. methods course should be aware of the major concepts, skills, and attitudes to be included, as well as the teaching strategies known to be effective in achieving these goals.

Much of the content of E.E. may be found in other disciplines, but in a non-environmental context. This condition makes the infusion of E.E. into an existing preservice teacher training programme seem very appealing. Theoretically, this should «simply» involve environmentalizing other required courses in the programme so that general education goals as well as E.E. goals can be met. Unfortunately, the process is not simple due to many constraints of time, money, expertise, and faculty cooperation. However, infusion models have been achieved, and processes are described in this document for developing infusion models which are very effective in helping teachers identify the environmental implications of their other coursework.

Whether E.E. content is infused in other courses or entire courses are selected for inclusion in the training programme, a process of analysis must be used to determine appropriate use of course material. One suggested

approach to this task is to refine the E.E. competencies and ask course instructors to analyze their own teaching to determine where the competencies are, or could be taught. This process introduces an additional constraint to be overcome in these approaches - faculty expertise.

Inservice teacher training is another necessary process for improving E.E. instruction in the world. Four basic models are used: (1) a superordinate training model; (2) a peer training model; (3) a modular training model; and (4) an eclectic training model which combines the other three approaches. Obviously, each approach will have its own strengths and constraints, making each applicable to different situations. These attributes must be considered and planned for, during the development of inservice programmes.

Efforts to improve pre- and inservice teacher training in E.E. may be expected to encounter significant difficulties in the process. Overcoming these difficulties will require commitment to the goals of E.E., careful planning, maximal use of available expertise and utilization of proven procedures of problem solving. As indicated in this document, the goal to prepare teachers in E.E. is worthwhile, and the mission is feasible. It is hoped that the suggestions and strategies presented herein, facilitate pre- and inservice E.E. teacher preparation efforts.

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